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Paper TRADE JOURNAL

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VOLUME 127, No. 5 JULY 29, 1948

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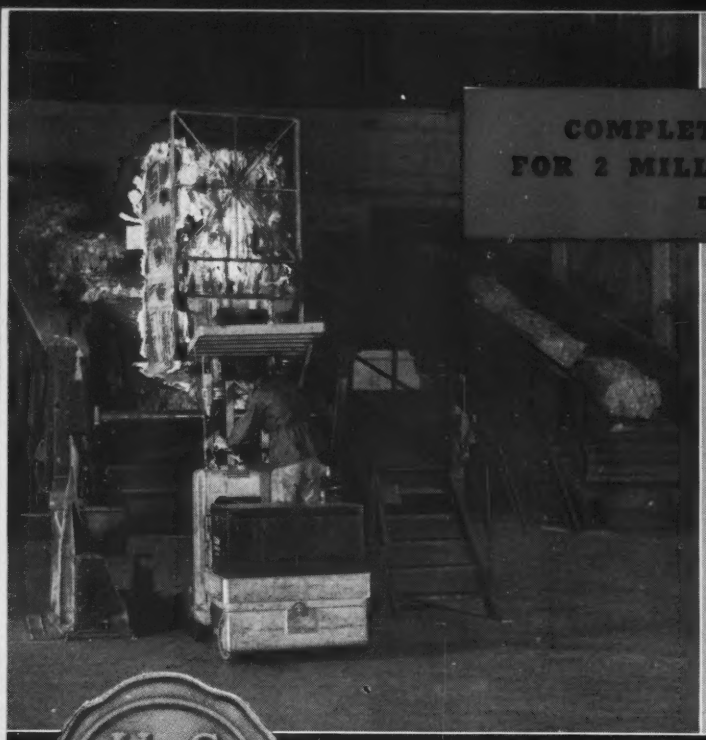

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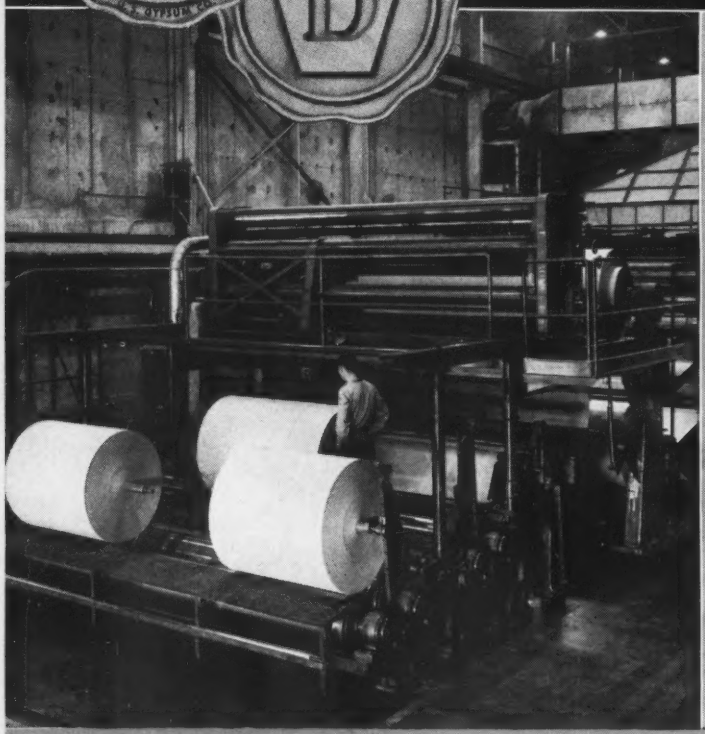

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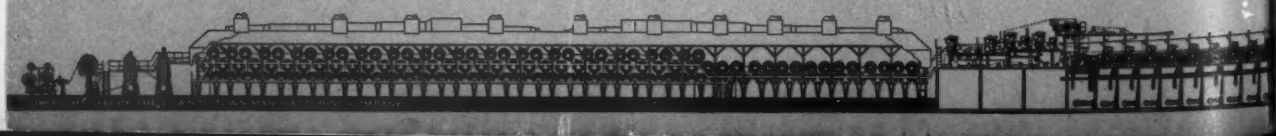

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CALENDAR OF COMING EVENTS

ASSOCIATION EXECUTIVES: Please send us your meeting dates and locations for this column as far in advance as possible. No charge for publication.

AUGUST 16-17: TAPPI Plastics Conference. Institute of Paper Chemistry, Appleton, Wis.

AUGUST 17-20: TAPPI Fundamental Research on "Physical Constituents of Wood." Madison, Wis.

SEPTEMBER 8-10: Technical Section, Canadian Association. Hotel Vancouver, Vancouver, B. C., not Harrison Hot Springs, as previously announced.

SEPTEMBER 27-29: TAPPI Mechanical Pulping Conference (Joint meeting with CPPA Technical Section) Poland Springs House, Poland Springs, Maine.

OCTOBER 11-14: TAPPI Testing Methods Conference at Mellon Institute, Pittsburgh, Pa. Headquarters, William Penn Hotel.

OCTOBER 25-28: Third Engineering Conference of the Pulp and Paper Industry Statler Hotel and Westinghouse Electric Co., Auditorium, Buffalo, N. Y.

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Paper TRADE JOURNAL

VOL. 127, NO. 5 REG. U.S. PAT. OFF. JULY 29, 1948

Pulp and Paper Branch Organized by ECA

WASHINGTON—A Pulp and Paper Branch has been organized as part of the Industry Division, Economic Cooperation Administration. This development was disclosed in the July *Industry Report. Pulp and Paper* issued by the Department of Commerce and received by *Paper Trade Journal* on July 24. Two executives from the United States pulp and paper industry are retained on a temporary consultant basis on all matters pertaining to the allocation of ECA funds for the purchase of all pulp and paper products, including newsprint, the report states.

ECA does no buying or procuring. It is a financing agency which makes available United States dollars for the purchase of commodities needed by the peoples of foreign nations participating in the Marshall Plan.

The bulk of such commodities (pulp and paper included) is bought through normal export-import trade channels. Private firms in the United States or in European countries form contact with private firms abroad. These European importers then get in touch with their home government agencies and request that ECA funds be allocated to them for the purchase of certain commodities from their foreign export connections. If their government agency approves their requests, applications for such funds are made to the Paris office of ECA, which in turn forwards the requests to ECA Headquarters, Washington.

The only ECA authorization released in the field of pulp and paper through July 8, 1948, was for $5,500,000 for the purchase of Canadian and Newfoundland wood pulp for the United Kingdom and also $1,434,000 for the purchase of Swedish newsprint for the Bi-Zone of Germany. Other requests for ECA funds for pulp and paper are being considered. When such requests for ECA funds are received in Washington they are studied and analyzed with respect to the availability of each commodity from various sources of supply. No requests to purchase a product in a particular country are approved, if it is determined that the supply is short of meeting the domestic needs of the country involved to the extent of causing unreasonable hardship.

Press-Time Flash!

Eastern Corp., securities will shortly be listed on the "Big Board."

Over-All Demand Leveling Off

WASHINGTON—Leveling off in over-all paper and board demand since the turn of the year, with supplies of most grades currently meeting market needs, marks the climactic end of the day-to-day struggle to solve production problems facing the industry from the early stages of the war, according to the Department of Commerce Pulp and Paper Industry Report for July.

W. L. Neubrech, chief of the Pulp and Paper Unit, Office of Domestic Commerce, said that it is, perhaps, hard for the average pulp and paper executive to realize that this change has actually taken place when for so many years he was confronted with one problem after another to meet his month-to-month production goals.

ALAN B. HELFFRICH

—named general sales manager of the Printing, Publication & Converting Paper Division of the St. Regis Sales Corp. . . .Mr. Helffrich, who has heretofore acted as Eastern Sales Manager of that division, has been succeeded in that position by William H. Donaldson, Jr. . . . A native of New York, Mr. Helffrich has been with St. Regis for 12 years, and has been associated with the paper industry since graduating from Pennsylvania State College in 1925. Prior to his association with St. Regis, he worked for the Fraser Paper Co., Ltd.; Eastern Corp.; Price Bros., Ltd., and the Orono Pulp & Paper Co. During his college years, Mr. Helffrich held national and international track records as a quarter and half-mile runner, and was a member of the 1920 and 1924 United States Olympic teams. He is a national vice president and charter member of the Salesmen's Association of the Paper Industry.

"Of course, not every single current problem has vanished," Mr. Neubrech said. "There is still difficulty in getting some machinery or equipment items as promptly as desired; there is still the possibility of a railroad car shortage during the midwest grain movement; there are a few chemicals which continue in tight supply and last, but not least, market wood pulp while available from overseas sources is too highly priced for many pulp-purchasing paper mills. But, by and large, it is believed that the pulp, paper, and board industry as a whole has reached a period when long range problems can again receive more thought."

Mr. Neubrech pointed out that notwithstanding the great movement and progress of recent years to place the pulp and paper industry on a sustained forest yield basis, the majority of companies find it economically advantageous to procure a substantial part of their pulpwood requirements from privately owned woodlands. Regardless of the excellent forestry practices applied by most companies on their own timber holdings and the application of equivalent practices on purchases from privately held lands, there continues the problem of sustained timber yield from such privately held forests drawn upon by the several forest products industries in addition to the pulp and paper mills.

"Great praise can properly be given to several of the pulpwood, pulp and paper associations, as well as some of the other forest product industries groups and to a number of individual companies, for their splendid forestry programs," the report states. "However, much more remains to be done to bring into proper management all timber lands and educate forest product manufacturers and private timber land owners of the necessity for such a program."

On the other hand the nonintegrated paper mills are confronted with the long-range prospect of the market pulp picture. No one can forecast what the world will be like in a decade or two ahead; a surmise is that more countries

(Continued on page 34)

Left to right: Ray L. Barton, superintendent of the Michigan Paper Co., Plainwell, Mich., past-president of the Superintendents Ass'n.; Dr. E. G. Albert of Edgar Bros., McIntyre, Ga.; Alfred B. Perlick of the Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.

Johnson Heads Michigan Supt's

KALAMAZOO, Mich.—Herbert B. Johnston, plant engineer of the Allied Paper Mills, was elected chairman of the Michigan division of the American Pulp & Paper Mill Superintendents Ass'n., at the division's annual dinner meeting July 20 at the Gull Lake Country Club. He succeeds William H. Astle, of Michigan Paper Co., Plainwell.

William F. Hathaway of the Kalamazoo Vegetable Parchment Co., was advanced to first vice-president, and William Shaw of the Michigan Carton Co., Battle Creek, was elected second-vice-president. Olin W. Callighan, of Edgar Brothers Co., was re-elected secretary-treasurer.

The slate of nominees was drawn up by the nomination committee and submitted to the membership by Raymond L. Barton of the Michigan Paper Co., a past president of the national association. He acted in place of Glen Sutton, nominating comimttee chairman, who was absent from the meeting.

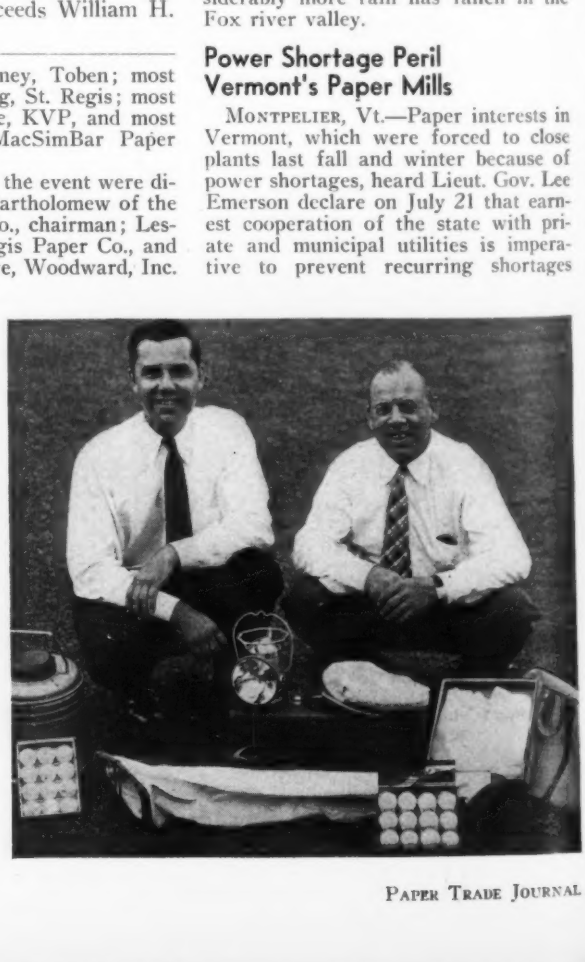
Sixty persons were present for the luncheon which opened the annual outing program, and 50 golfers teed off in the tournament starting at one o'clock.

Prizes were awarded as follows at the dinner meeting:

Low net, Wendell R. Toben, American Box Board Co.; low gross, Arthur Woollam, Gould Pumps; most 4's, William Honey, Stowe - Woodward, Inc.; most bogus money, John Vandenberg, R. T. Vanderbilt Co.; blind bogey, C. E. Van Buren, Albany Felt Co., who won the toss to break tie with Howard L. Vanderberg of the Staley Starch Co., and George Sullivan of the St. Regis Paper Co.

Other prize winners included: Low net, blind hole, Robert Milroy, E. M. Sergeant Co., and W. J. McClaren, Corn Products Refining Co. (tie); second high bogus money, Toben; most 5's, Jack W. Hartung, St. Regis; most 6's, Lester LaLiberte, KVP, and most 7's, Clem Sisson, MacSimBar Paper Co.

Arrangements for the event were directed by Paul W. Bartholomew of the Hawthorne Paper Co., chairman; Lester J. Smith, St. Regis Paper Co., and Roy Holden of Stowe, Woodward, Inc.



Two of the three Sports and Field Day committeemen. Left, Paul R. Bartholomew of the Hawthorne Paper Co., (chairman) and right, Lester J. Smith of the St. Regis Paper Co. Absent when the photographer came around was Roy W. Holden of Stowe-Woodward, Inc., the third committeeman.

Canadian Woodsmen Seek Pay Boost

OTTAWA—Forest workers have demanded a 25-percent pay increase beginning September 1. Current pay rates are $6.50 a day.

Notification came on the heels of increases of $3 to $4 a ton in the price of newsprint in Canada and the United States.

Abitibi Power & Paper Co., Ltd., raised its price $4 a ton on July 23 to a base of $96 in Canada and $100 in New York City.

Other Canadian newsprint makers are discussing price boosts.

Jack Quinn, president of the Lumber & Sawmill Workers Union and chairman of a joint negotiating committee, called for a meeting with newsprint operators in Toronto Aug. 19 to discuss the wage demand. Approximately 18,000 workers are affected.

Wisconsin and Fox Rivers at Low Stage

APPLETON, Wis.—The Wisconsin and Fox rivers thus far this year have been far below normal, and officials of the pulp and paper mills in the two valleys have expressed concern over the power situation. In general, the situation is worse in the Wisconsin valley than in the Fox, despite the reservoir systems of the Wisconsin Valley Improvement company along the Wisconsin, for considerably more rain has fallen in the Fox river valley.

Power Shortage Peril Vermont's Paper Mills

MONTPELIER, Vt.—Paper interests in Vermont, which were forced to close plants last fall and winter because of power shortages, heard Lieut. Gov. Lee Emerson declare on July 21 that earnest cooperation of the state with priate and municipal utilities is imperative to prevent recurring shortages

which are retarding Vermont's industrial progress.

Warning that the power situation might against become acute within the next few months, Mr. Emerson said that while consumption demands for electricity were jumping by leaps and bounds in Vermont, stream flow reliability to provide power, which is 95 percent hydro developed in Vermont, had declined.

The demand for electricity in Vermont doubles itself about every 12 years, which is approximately the national average, he said. Pointing out that there had been no large-scale power developments within Vermont in recent years, he advocated additional hydro power developments where feasible and the public good would be served.

Building of storage reservoirs where practical as an aid to power plants, planned developments by power companies to take care of customers' needs by securing additional power with steam or diesel auxiliary, and tie-ins to insure firm electric power were named by Mr. Emerson as needs to be met in attacking the power problem.

Enemy-Owned Patents Available to Americans

WASHINGTON—A compilation of abstracts of 358 United States patents including a number applying to paper making, formerly owned by nationals of enemy countries and seized by the Department of Justice, Office of Alien Property, since November, 1945, has been prepared by the Office of Technical Services, Department of Commerce. Most of the patents are available for licensing to American firms by the Office of Alien Property on a royalty-free, non-exclusive basis for the remaining life of the patents.

Copies of the compilation (Report PB-88841, *List of Vested Patents Available from Office of Alien Property*, 85 pages) sell for $4.00. Orders should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D.C., accompanied by check or money order payable to Treasurer of the United States. Copies of the patents may be examined in Room 1325, Commerce Building, Washington, D.C.

A leaflet called *Index and Guide to Enemy Patents Vested in the Attorney General as of January 1947*, which contains general information about the availability of enemy patents, is available free of charge from either OTS or the Alien Property Custodian.

All communications concerning the licensing of enemy patents should be addressed to the Office of Alien Property, Department of Justice, Washington 25, D.C.

Copies of individual patents may be purchased only from the Commissioner of Patents, U.S. Patent Office, Washington 25, D.C., for 25 cents each. Orders must specify the serial number of each patent desired.

Reciprocal Trade Agreements Create Paper Duty Problems

NEW YORK—The various reciprocal trade agreements are resulting in a large variety of new problems of classification of imported papers, according to Warren B. Bullock, manager of the Import Committee of the American Paper Industry.

Imports of recognized grades on which duty rates were reduced by the various agreements with paper making countries are increasing. Among the new problems for determination are the following:

(1) Laminated paper with one sheet corrugated as a protective wrapping, claimed dutiable as wrapping paper, but believed by the Import Committee to be dutiable at a higher rate as a manufacture of paper; (2) Paper bags made of surface decorated paper, claimed dutiable at the rate for manufactures of paper; (3) Wood veneer on paper, claimed dutiable as uncolored hanging paper; (4) Toilet paper in rolls, claimed to be dutiable at the rate for manufacturers of paper, and not at the higher rate for tissue paper; (5) Tarred kraft paper, claimed to be dutiable as sheathing paper; (6) Paper for a Florida newspaper, weighing over 35 pounds, and containing over 35 percent sulphite, claimed duty-free as standard newsprint; (7) Paper napkins and doilies, claimed to be dutiable as paper cut into shape at 15 percent, believed to be dutiable as manufactures of paper at 35 percent; (8) Greaseproof paper, imported at Rochester, N. Y., claimed dutiable at one cent per pound and five percent as vegetable parchment, has been classified for duty by Customs officials as greaseproof paper at three cents per pound and 15 per cent.

India to Manufacture Newsprint

WASHINGTON—A newsprint factory for producing 30,000 tons annually will be built in India this year, and production will start by June, 1949. This will be India's first newsprint factory, designed to supply the total internal demand.

It will not use a hardwood tree known as "broadleaf" (also called "jet-propelled") which grows in 5,000 square miles of forest in the Central Provinces of India.

The finished product will be of a very fine grade and superior in strength and quality to what is being made in the factories of the West, according to a report made after ten months' experiments by Dr. Campbell, Canadian newsprint technologist.

The Indian method was developed by P. N. Nair, a Government employe. Before Nair, the Tatas had attempted to manufacture newsprint in India by the same method as the Western. As the spruce and fir were found only on Himalayan heights and it was uneconomic to procure timber from there, the attempt failed. Later, the Government Forest Research Institute at Dehra Dun tried with deciduous trees, but found them unsatisfactory. A sort of paper could be made from some of them, but it was too weak to run on a fast-moving rotary machine.

Nair resigned his job in October, 1946, to work whole time on his experiments, and by January, 1947, was able to give convincing proof that newsprint could be manufactured from the "broadleaf" tree. By using it as raw material, the cost of manufacture is expected to be 40 per cent lower than that in other countries.

Robert A. Rankin, consulting industrial engineer of Montreal, and A. M. Koroleff, director of Woodlands Research, Pulp and Paper Research Institute, Montreal, whose services have been lent by the Canadian Government, are helping to set up the factory.

The factory will be located three and one-half miles from Chandni, a small railway station on the Bombay-Delhi line. At present the area is thick forest. The nearest village is two miles distant, with a population of 55. Here the first 500 acres of land, now being cleared, will hold a township of 30,000 people.

The factory's authorized capital is $15,000,000, of which only $4,500,000 will be issued. The Government of the Central Provinces has agreed to take ten per cent of the share capital, and to give the Nepa Mills (National Newsprint & Paper Mills, Ltd.), which owns it, all the needed facilities.

India's supplies at the present rate, without re-afforestation, will be sufficient for 120 years. The "broadleaf" grows 60 feet in 15 years. The agricultural plantation on the mill site is in charge of a young Indian woman, Rajul Shah, who graduated from the University of Michigan and is a specialist in plant breeding. She supervises the planting of young trees on 1,500 acres a year. These will eventually be cut with a full yield every three years—a tree replaced for each one felled.

Present capacity of the Nepa Mills is 100 tons a day, but it will be increased to 300 tons within five years.

Newspapers Sign for Nearly All Coosa Output

BIRMINGHAM, Ala. — Long-term newsprint contracts for nearly 90 percent of the projected tonnage of the plant of the Coosa River Newsprint Co., under construction at Childersburg, Ala., have been signed, President E. L. Norton stated on July 22. Mr. Norton added that contracts have been placed for machinery and equipment and that positive assurance has been received from the manufacturers that their production schedules will meet the deadline which provides for completion of a two-machine mill early in 1950. The mill is to have a rated daily capacity of 300 tons of newsprint paper and 200 tons of bleached sulphate pulp.

The latter production, to the extent it exceeds paper mill requirements, was disposed of last year to the Kimberly-Clark Corp. on a long-term contract at the time that Kimberly-Clark assumed responsibility for Coosa River management and operation.

Among the more than 100 newspapers which have signed contracts with Coosa River are: Kansas City *Star*, St. Louis *Post-Dispatch*, Cleveland *Plain Dealer*, Washington *Star*, Fort Worth *Star-Telegram*, Dallas *News*, Houston *Post*, Buffalo *Courier-Express*, New Orleans *Times-Picayune*, Birmingham *News-Age-Herald*, Miami *Herald*, Atlanta *Journal*, Louisville *Courier-Journal and Times*, Richmond *News-Leader*, Indianapolis *Star*, Chattanooga *Times* and *News Free-Press*, Nashville *Banner* and *Tennessean* and Raleigh *News* and *Observer*.

Early July Pick-Up Reported by Merchants

CINCINNATI—John L. Richey, secretary-treasurer of the Paper & Twine Ass'n., on July 19 said: "A canvass of general business in Illinois and Michigan at meetings held in Chicago and Grand Rapids during the week ending July 17 indicate that paper merchants on the average had a lower volume in both dollars and units in the second quarter of 1948 than in the first quarter of the year but the feeling was expressed that part of this was due to the fact that we are experiencing a normal seasonal decline for the first time since the war. However, the first ten days of July seemed to show an increase in inquiries and general activity although buyers are still criticizing price and quality."

Dixie-Container Suit Remanded to Lower Court

EASTON, Pa. — The United States Circuit Court of Appeals for the Seventh Circuit on July 16, handed down an opinion in a patent infringement action brought by the Dixie Cup Co. against the Paper Container Mfg. Co., Chicago.

The Circuit Court affirmed the lower Courts' finding and its own earlier holding of infringement against Paper Container and in favor of Dixie as to one group of paper cup making machines and reversed as to other groups. Only one of Dixie's patents was in issue on this appeal and the treble damage award in favor of Dixie is in excess of $150,000.

The case is remanded to the lower Court for a further determination as to its award of attorneys and master's fees and other charges, which could add substantially to the judgment in Dixie's favor in the event the lower Court adhere to its earlier ruling.

Bowles Rumored Seeking Collins Plant

SPRINGFIELD, Mass. — Sherman H. Bowles, publisher of the Springfield Newspapers, is reported negotiating for purchase of the Collins Mfg. Co., in North Wilbraham, to manufacture newsprint.

Foster W. Doty, president of the Union Trust Co., acknowledged that there might be truth to the reports Mr. Bowles was angling for the plant, but added that the property has not yet been purchased.

Champion Plans Mill For Evadale, Tex.

HOUSTON, Tex.—The Champion Paper & Fibre Co. Houston Division at Pasadena, Tex., has preliminary plans for the construction of a paper mill at Evadale, Tex., where a site was selected several months ago. Evadale is about 20 miles north of Galveston. The project will include a number of multi-story buildings with machinery and facilities for large output. Construction cost of the initial structure is expected to exceed $1,000,000.

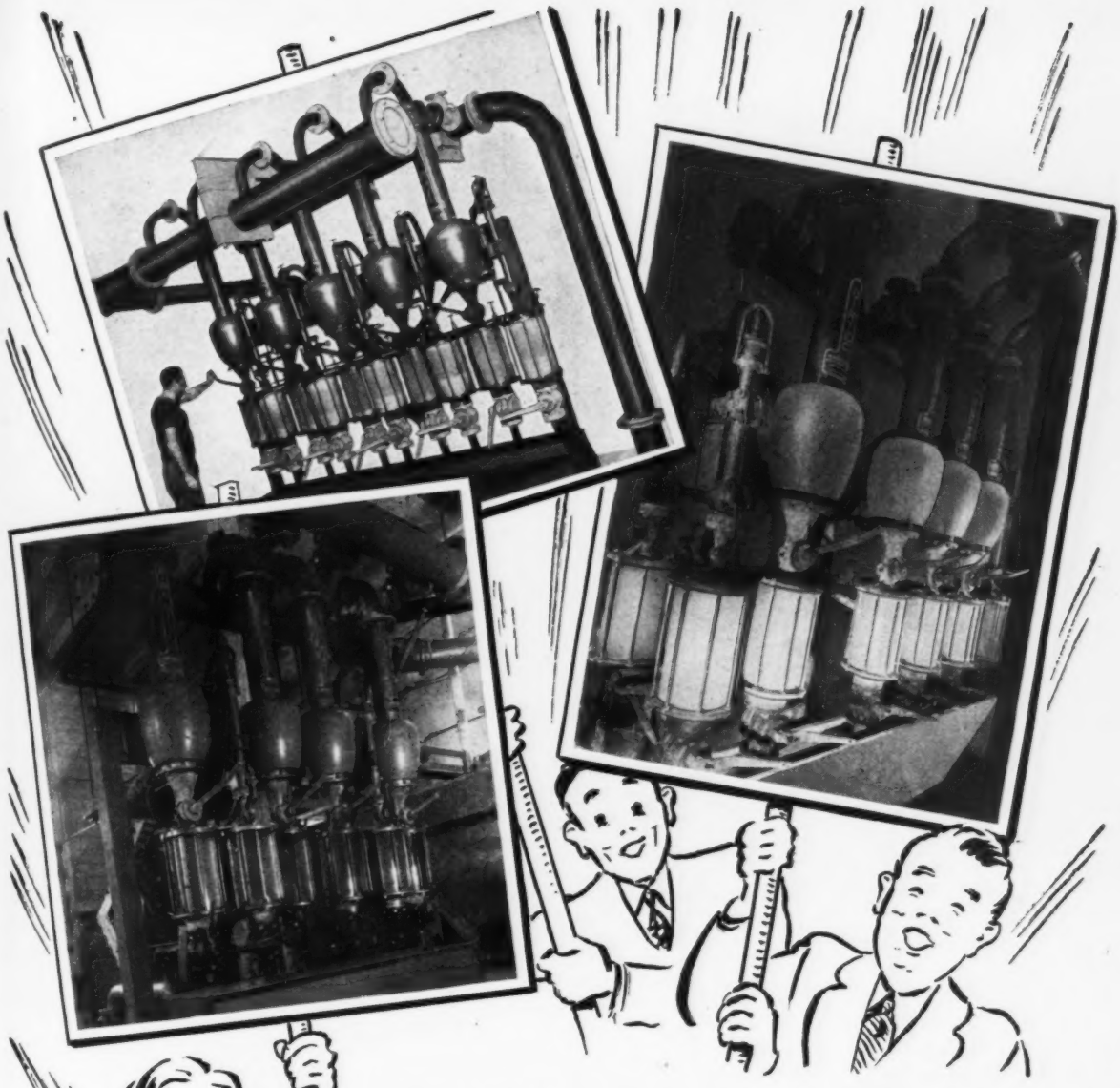
International's Niagara Falls Mill Wins Safety Honors

NIAGARA FALLS, N. Y.—The Niagara Falls mill of the International Paper Co. has won first place honors in the company's 50th anniversary safety campaign. Competing against mills in the Northern division, the local plant established a frequency rating of 3.79 for the six months of this year, two points less than the average for the division.

PAPER AND BOARD: PRODUCTION, BY TYPE, MAY 1948

(Tons of 2,000 pounds.) (Source: U. S. Dept. of Commerce)

TYPE OF PAPER	MAY, 1948	APRIL, 1948	MAY, 1947
ALL TYPES, TOTAL	1,906,852	1,907,516	1,833,648
Paper, total	959,535	953,290	929,534
Newsprint	74,171	70,853	73,002
Groundwood, printing & specialty paper, total	71,669	69,660	73,580
Printing	47,710	46,656	44,774
Converting	20,800	19,339	22,862
Other	3,159	3,665	5,944
Book paper, total	197,887	195,046	189,714
Printing	151,522	148,899	140,450
Converting	39,134	37,463	47,448
Other	7,231	8,684	1,816
Fine paper, total	103,520	104,393	107,323
Writing, total	78,889	78,910	80,619
Rag (including index)	11,446	11,755	15,732
Chemical wood pulp	67,443	67,155	64,887
Cover and text	6,062	7,218	8,055
Bristols (except rag index)	11,209	10,154	11,524
Thin	6,184	6,289	6,074
Other	1,176	1,822	1,051
Coarse paper, total	267,586	265,314	250,484
Glassine, greaseproof, & vegetable parchment	10,992	11,174	13,952
Wrapping, total	65,695	68,812	69,304
Unbleached kraft	30,746	31,099	28,177
Other	34,949	37,713	41,127
Bag, total	55,590	53,528	50,191
Unbleached kraft	50,770	49,048	46,938
Other	4,820	4,480	3,253
Shipping sack	62,505	59,671	49,072
Converting, total	72,804	72,129	67,965
Unbleached kraft	42,020	43,171	40,662
Other	30,784	28,958	27,303
Special industrial	23,613	26,930	26,390
Sanitary	83,443	85,236	77,841
Tissue	20,117	19,699	16,807
Absorbent	9,309	9,984	7,917
Building paper	108,220	106,175	106,476
Paperboard, total	816,296	831,168	793,019
Liners	298,045	294,416	276,176
Corrugating material	110,027	121,633	119,378
Container chip and filler board	30,893	26,396	23,180
Folding boxboard	180,864	185,817	203,681
Set-up boxboard	51,126	53,238	50,418
Cardboard	7,119	6,695	7,234
Other paperboard	138,222	142,973	112,958
Wet machine board, total	10,224	11,389	11,781
Shoe board	3,802	4,450	4,033
Binder board	3,450	3,713	4,000
Other	2,972	3,226	3,748
Building board	120,797	111,669	99,314



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As these installation pictures indicate, any number of DIRTEC units may be employed, depending on the volume of stock and the amount and character of dirt it contains. DIRTECS are exceedingly easy and inexpensive to install, operate and maintain.

Ask us to show you what they can do for you

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

FOSTER-WHEELER TRIO ADVANCED

The Foster-Wheeler Corp., New York City, has announced three changes in its sales staff. . . . H. B. Wallace, Jr. (center) has been appointed manager of steam sales for the corporation. He had been manager of the New England territory in Boston since his return from the armed service. . . . A. F. Downham (left) has been appointed manager of the New England territory succeeding Mr. Wallace. Mr. Downham was formerly in the sales department of the Pittsburgh office. . . . W. H. Hardie (right) has become associated with the New York sales office and will concentrate on the sales of steam generators, pulverizers, superheaters and related products.

Calco Willow Island Melamine Plant Operating

BOUND BROOK, N. J. — Calco Chemical Division of the American Cyanamid Co. reports that its melamine plant at Willow Island, W. Va., is in operation. Rust Engineering Co., Pittsburgh, in charge of installing equipment, has completed its work and turned the plant over to the company.

Cyanamid's fundamental research on nitrogen compounds and its extensive engineering facilities combined to solve this difficult problem, and in 1939 the first carload of melamine was produced in a Cyanamid plant. Since that time melamine derivatives have served many industries, including the paint and varnish, plastics, paper, and textile industries. Melamine resins make possible today's outstanding finishes for refrigerators and automobiles. Derivatives from melamine produced at Willow Island are marketed under such trade names as Melmac, Lanaset, Laminac, and many others.

Ferguson Company Establishes Atomic Energy Division

NEW YORK — The H. K. Ferguson Co., industrial engineers and builders of Cleveland, New York and Houston, on July 26 disclosed formation of an atomic energy division to specialize in nuclear engineering problems. Dr. Karl Cohen, former director of the Theoretical Division of the Manhattan Project Laboratory, who recently joined the Ferguson organization, will direct its activities.

Dr. William I. Thompson, a development engineer for the Standard Oil Development Co. for 11 years, and one of the first engineers to be called into Manhattan District Project, will head the engineering section of the technical group. Other personnel to form a nucleus of this group have been drawn from the Ferguson engineering department, including J. T. Weills, until recently a group leader in the technical division of Clinton Laboratories, Oak Ridge, Tenn.

Maxson's Davis Supervising Sweden-Norway Installations

WESTERLY, R. I.—Harry E. (Ed) Davis of the Maxson Automatic Machinery Co., erecting engineer left recently for a visit of several months to Sweden and Norway where he will supervise installation of overlapping delivery Erie Lay-Boys, NAMCO counters and markers and SIMCO static eliminators for the following mills: *Sweden*—Hafrestroms A/B, Haverud; Billeruds A/B, Saffle; Katrinefors A/B, Mariestad; Lessebo A/B, Lessebo, and Forssa Bruks A/B, Nasviken. *Norway*—Follum Fabrikker, Honefoss.

Brown Again Adds To Sales, Service

PHILADELPHIA—Another increase in the branch and regional sales and service staffs of Brown Instrument Co. is reported by William H. Steinkamp, field sales manager of the industrial instrument division of Minneapolis-Honeywell Regulator Co. The additions follow — Atlanta: G. L. Ferguson assigned as a sales engineer; Baltimore: Wayne Cook and Carl Lower assigned as service engineers; Boston: Warren N. Smith and Albert E. Phillips assigned as service engineers; Charlotte: W. Williamson, Jr., assigned as a service engineer and R. J. Holt as sales engineer; Chicago: Bernard Fuller and Ormond Herring assigned as sales engineers; Cleveland: R. Schumaker, sales engineer; Denver: Robert Koening, service engineer; Detroit: W. DeWolf, service engineer; Dallas: Robert Harris, Jr., sales engineer; Houston: C. D. Walker, sales engineer; Indianapolis: Barry Coleman and Robert Thomas, service engineers; Los Angeles: Richard Corbin, service, and Ralph Imbrogno, sales; New York City: A. Godfrey, sales, and Ernest P. Lang, William C. Meyer and Edward J. Roach, service; Philadelphia: A. L. Rogers, Jr., sales, and Albert T. Collins, Joseph Facer and Edward A. Lytle, service; St. Louis: Keith H. Webb, service; Syracuse: Richard Caviniss and George Wilson, service; Washington, D.C.: John R. Shea, service; Kansas City: D. W. Rees, service; Omaha: H. C. Klug, sales; and East Orange, N. J.: William Harris, sales.

Reichhold Gathering Sept. 13, To Draw from 26 Nations

DETROIT—Executives of Reichhold Chemicals, Inc., branch plants and sales offices, in 26 nations will attend a weeklong convention in Detroit beginning September 13, Henry Reichhold, chairman of the board, told PAPER TRADE JOURNAL on July 23.

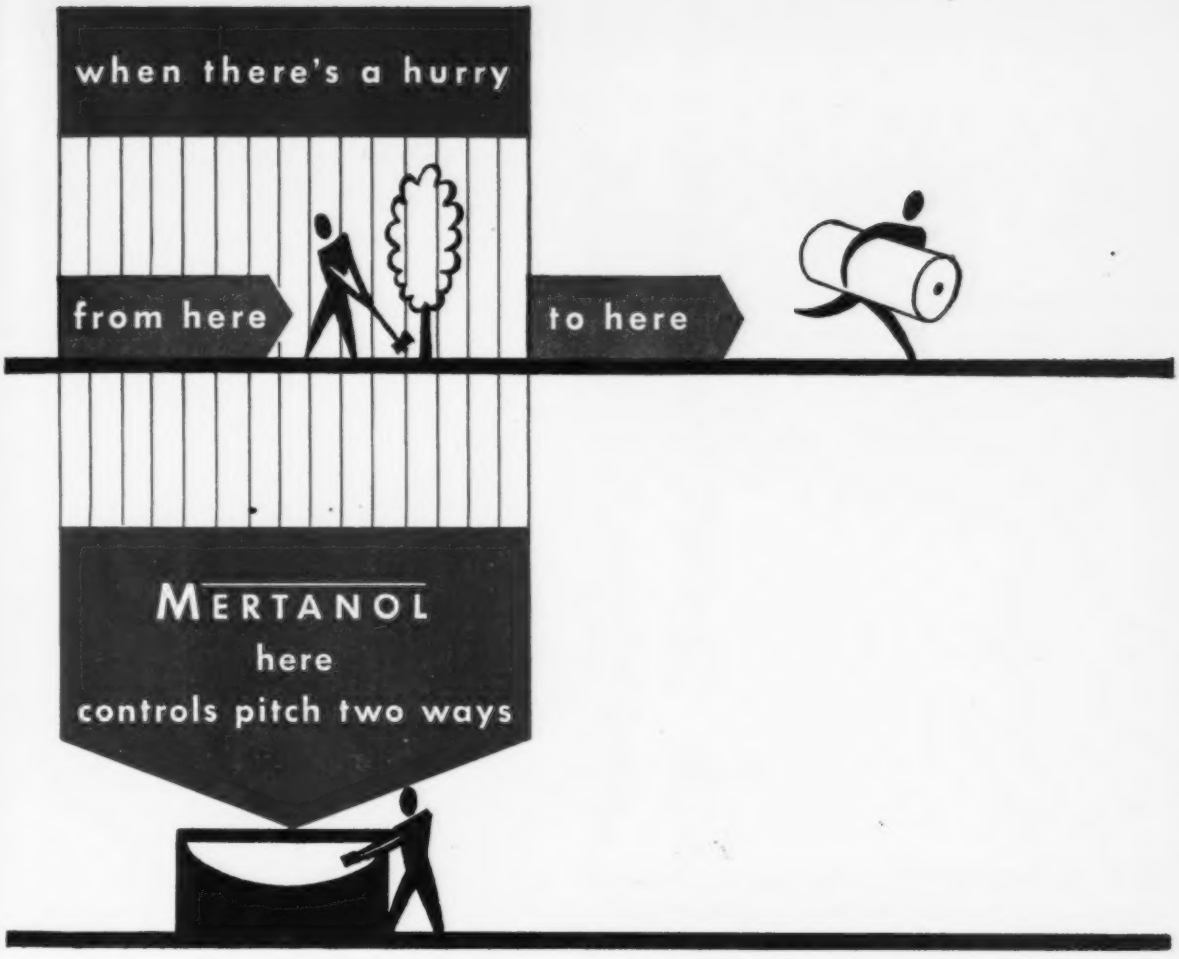
Reichhold, world's largest producer of synthetic resins, has invited plant managers and sales and service executives from each of the corporation's units to attend. Besides the United States, representatives will be present from Argentina, Australia, England, Canada, Chile, Columbia, Paraguay, Peru, Portugal, Czecho-Slovakia, Denmark, Dutch East Indies, Finland, France, Holland, Spain, Sweden, Switzerland, Hungary, Italy, Mexico, New Zealand, Norway, Turkey, Union of South Africa and Uraguay.

It is believed that no group of such varied nationality ever before has been gathered in Detroit.

Purpose of this first international conference to be held by Reichhold Chemicals, Inc., since its founding in 1925 was describey by Mr. Reichhold as "the expansion of international trade through discussion of raw material problems, and to better enable the Reichhold organization to do its part toward rebuilding world economy."

Technical symposium will acquaint the foreign executives with improved techniques developed at the home plants in the U.S.A. and one day will be devoted to a plant tour and official opening of Reichhold's new phthalic-anhydride plant, one of the few such producing units in the world.

Hea uarters of the visitors will be the Book-Cadillac Hotel, Detroit.



Pitch troubles caused by unaged wood are greatest in summer months . . . the more reason why paper makers should investigate Monsanto's Mertanol 7L *now*. Two-way pitch control is readily achieved . . .

- **by helping to keep pitch dispersed**
- **by absorbing pitch physically**

Spotted paper, plugged screens and wire, stuck paper on drying rolls and dry cans can be eliminated by adding a small amount of Mertanol 7L at the paper beaters.

Before pitch troubles accumulate it will pay to take advantage of Monsanto's synthetic organic sulfonic acid product. The coupon below will bring complete information. Mertanol: Reg. U. S. Pat. Off.

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Dept. PTJM4, Boston 49, Mass.
Please send me full information on Mertanol for pitch control in paper making.

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Floods Left New Forest Fire Danger

WASHINGTON—A crew of U. S. Forest Service watershed experts dispatched to the Pacific Northwest last May 27 when the flood in the Columbia River basin was in full tide, to make a survey of flood damage to natural forest property and to study the relation of previous land use to the disastrous inundation, has reported its findings, Chief Forester Lyle F. Watts reported on July 19.

Members of the crew were ordered to the flood area from national forest headquarters in Ogden, Utah; Missoula, Mont.; Berkeley, Calif.; Portland, Ore.; and Washington, D. C. They spent June studying the headwaters of the basin and upland watersheds on the ground and from the air. The watershed includes 259,000 square miles, 39,000 of which is in British Columbia, Canada. It is 750 miles long north and south, and 500 miles wide, from the Pacific Coast to the Continental Divide. The basin uplands, chief source of the region's water supply, contain 31 national forests with an area of 44,000,000 acres, about three-quarters of their forest land. It is one of the country's main sources of timber.

Main points of the report are:

(1) With the 1948 forest fire season in the Pacific Northwest onyl a few weeks away, the effect of flood damage on fire control operations in the basin is "appalling." Roads, trails, bridges, telephone lines, essential to movement and direction of fire fighters and equipment, have been damaged and disrupted to such an extent that fire control operations will be seriously hampered unless immediate repairs can be made on 15 national forests with a gross area of 25,000,000 acres. Similar but less severe damage was reported on the remaining 16.

(2) The major flood waters were caused by extraordinary weather conditions. Abnormal accumulations of snow, late spring, then prolonged rains and a sudden, unseasonable hot spell. However, the watershed technicians found ample evidence that damage to lands, improvements and property on the upland watersheds would have been far less severe, and that considerable water would have been held back until after the flood peaks had passed, if millions of upland acres in the basin had not been previously deprived of their plant and forest cover.

(3) Forest fire has been the most important factor in denuding millions of these watersheds acres, though logging, grazing, farming, mine or smelter operations and road-building, frequently done without apparent consideration for watershed values, were other causes. On land now in national forests alone, there are 5,126,000 acres that have been burned over, all but a fraction before 1935 when the Forest Service began giving this "back country," previously held to be of low value, intensive fire protection.

Striking evidence that forests slow the rate of snow melt and thus delay water flow was observed. As late as June 14, about 15 days after the flood peak, timbered areas in the uplands were snowless. This was partiacularly apparent at higher elevations. In many instances, burned and denuded north and east slopes, though normally cooler, had lost all their snow, while timbered south and west slopes were still snowbound.

Rough ground measurements in small drainages scattered through the forestland parts of the basin showed peak discharges from severely burned drainages averaging 50 percent higher than from unburned ones of similar elevation and topography. Water run-off from burned or logged drainages also produced more debris, caused more channel and bank cutting, more sedimentation in lower streams, and damage to roads and bridges. This was true also where only a part of the drainage was burned, over-grazed, logged, or otherwise disturbed. Twelvemile and Tamarack Creeks in Montana respectively drain 40 and 30 square miles. Cover on Twelemile is 95 percent intact, while Tamarack has 70 percent timber cover, 25 percent logged, and five percent burned. Peak flow from Tamarack was 43 cubic feet per second per square mile as against only 30 from Twelvemile. Water ran comparatively clear from Twelvemile, but Tamarack washed down enormous quantities of coarse gravel and logging debris.

A graphic picture of the flood damage actually in the making in the high country is presented. During the heavy rains and snow melt practically every mountain stream and channel disgorged torrential flood waters, especially those that drained burned or denuded watersheds. On steep grades, channels were severely gouged and eroded, and gravel, boulders and debris carried into the flat meandering valley streams which were unable to contain the deluge. Wood from burned or logged watersheds, and rocks and oil torn from the earth choked the channels. It formed dams at bridges and other points. As the floods rose, the dams and often the bridges went out, surging debris-laden waters down on national forest recreation and other developments, logging operations, farms and scattered homes and villages.

Of the vast amount of flood waters, primarily from the basin-wide, simultaneous snow melt, the report says the discharge from upland drainages was probably not much above four percent. But it did to national forest property and improvements damage now estimated at $6,000,000 but expected to go higher, and $4,800,000 damage to intermingled and adjacent private property. On national forests alone, amid other destruction, 500 bridges were wrecked or impaired, 4,300 miles of roads were cut by washouts, 980 miles of communication lines were disrupted, and 106 recreation areas damaged. In many places, public highways must be repaired before the Forest Service can begin repairs to its own projects, efforts to reach them now involving detours up to 200 miles, a situation that alarms fire control men. Logging operations in the area are at a standstill in most of the basin with logging roads and railroads under water, mills shut down, mill ponds crammed with debris, loggers gone from the woods, and several large mills not expected to be able to resume operations this summer.

Present-day cutting or logging practices were found by the investigators not to have been an important factor in the recent floods. They warned, however, that as logging extends up the slopes to higher, more critical areas, practices comparatively harmless at lower levels may cause considerable damage to the watershed.

Reed Bailey, director of the Intermountain Forest and Range Experiment Station at Ogden, Utah, headed the Forest Service crew.

PALMER C. MACDONALD

—named manager of the Portland division of Blake, Moffitt & Towne, succeeding Clinton L. Shorno who is retiring after many years of active service with our company. . . . Mr. Macdonald has been with the firm for 25 years. Starting in the warehouse and working his way up through the organization, he was appointed manager of the Salem division in 1929 and a few years later sales manager of the wrapping paper and stationery departments at Portland. His active interest in civic and community affairs is marked by his present service as a member of the Board of Trustees and Treasurer of the Multnomah Athletic Club, and as a member of the Board of Directors of the Irvington Club.

Columbia's plants and those of its affiliate, Southern Alkali Corporation, are favorably located and are integrated with well organized distribution facilities.

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Equally important—Columbia policies contribute to enduring business relationships.

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PITTSBURGH PLATE GLASS COMPANY

The Paper Outlook

Report released July 21 by the Paper Committee of the National Ass'n. of Purchasing Agents, under the supervision of Chairman T. A. Corcoran, Courier-Journal and Louisville Times Co., Louisville, Ky.

For the last four weeks, U. S. production of all paper has been less than 100% of six day rated capacity—the last week's 95.3% comparing with 106.1% for the same week of last year. For the month of May, the production ratio figure was 100.4%, compared to 102.5% for April and 106.2% for May, 1947. This indicates that supply of paper in general has overtaken demand. This does not apply to all grades, certainly not to newsprint and kraft, and probably not to tissues.

Most other grades continue to ease. But this has not resulted in any weakening in prices, although there has been a very marked improvement in quality. There are even reports of increases to come in some grades of rag papers, in spite of the fact that this grade, as a whole, is reported to be in easy supply.

Kraft Paper

By JOHN W. AMOS
Montgomery Ward
Chicago, Ill.

Kraft paper definitely has eased up and sufficient should be available, during July and August, to meet all demands.

As a matter of fact, mills have been actively soliciting possibilities for delivery during these two months. This is a temporary situation, however, as evidenced by the fact that prices have not declined; 6¾c to 8c, mill delivery, is still unusual and most distributors jump at the chance to obtain kraft within this range.

The outlook for September, October and November is not good. All commitments have been taken up and the chances are that kraft will continue to be short for the rest of this year, even though no increase in price is anticipated.

Wood Pulp

By H. L. WEBER
Fibreboard Products, Inc.
San Francisco, Calif.

There is not too much change in the pulp picture from a month ago. Based upon continued good business for the balance of this year, the over-all pulp picture should be satisfactory during that time.

Supply of pulp is holding up. This, of course, is the time when the Scandinavian countries are making their maximum shipments. Inventories are being built up but are not yet too large. There is a marked improvement in the inventory position of the various grades. The oversupply of some grades of pulp and the shortages of others are being gradualy replaced by a more even supply of all.

The consumption of pulp, while still on the increase, is beginning to flatten out. This does not mean that there will be a reduction in consumption, but that consumption is reaching its maximum point and leveling out at that figure.

There is, as yet, no indication that the contract prices of pulp will be reduced in the fourth quarter, but it does appear that the higher spot prices will show some weakness as the year progresses. Mill costs have increased, partly due to increased wage rates already granted and higher prices of certain raw materials. In spite of these increases in cost, it now appears that these will not be reflected in increased prices. This may be partly due to the fact that supply and demand are practically in balance.

Summing it al up, and borrowing a word that is becoming popular in our courts, the supply-demand-price picture seems to have reached a point of status quo.

Fine Papers

By E. E. McCULLEY
Courier-Journal Job Printing Co.
Louisville, Ky.

The supply-demand ratio in fine papers continues to improve each month. The supply of the rag grades is somewhat in excess of demand and some mills are beginning to beat the bushes for orders.

In the sulphite grades, material easement has developed and offers of important tonnage are not easily finding a home. In most cases, large-tonnage users have developed satisfactory sources of supply many months ago and mills who now find it to their interest to solicit this business, for which they had previously shown no relish, are not finding the going as easy as expected.

Some, for the first time in years, are taking a look at the scales upon which commercial values are weighed. They seem surprised to find that one of the weights they must counterbalance still bears the label of DEPENDABILITY. Unless the cold war turns hot, accidently or otherwise, there seems to be no reason why these trends in paper should not continue.

Most papers are improving in quality, and some very rapidly. Some unpleasant inventory problems could develop in merchant and large user stocks if these are not kept clean and currently representative of the best sheets available. The salvage paper outlets are not to be depended upon for help in this matter, at this time, unless the owner is willing to accept substantial losses. They are very busily engaged in cleaning up their inventories of substandard papers. Improvement has been very rapid in the last 30 days; so, safety in respect to substandard inventory requires constant and informed checking of inventory, current quality available and minimum replacement.

Paper Containers

By LEE R. FORKER
Quaker Stock Oil Ref'g. Corp.
Oil, City, Pa.

The trend continues to easy availability of all types of paper containers, as indicated in our last report.

There seems to be some improvement in quality, with prices remaining unchanged. Reports from substantial buyers of paper containers indicate widespread restyling, especially of internal packing to improve condition of contents for the eventual customer.

There is no report to indicate substantial price change, even though box manufacturers are faced with higher labor, material, and transportation costs.

The demand has softened for some types of consumer products, decreasing demand for paper containers, and, in several sections of the country, competition is very keen for corrugated paper and solid fibreboard box business.

Within the next 60 days, a very substantial part of the food crop of mid-year will be packed, requiring tremendous quantities of various types of paper containers. At this time, it appears that the industry can easily take care of the demand.

On impartial tests recently conducted by one large user of corrugated paper boxes, it was found that the average Mullens bursting strength test had improved in excess of 10%, as compared with a year ago, thus indicating that better boxes are currently becoming available.

Newsprint

By T. A. CORCORAN

The first trial balloon for a price increase was sent up on June 28, in the form of a statement by the president of one of the Canadian mills that higher manufacturing costs will probably force a price increase before September. The figure mentioned is $6.00. Although it is realized that manufacturers have had some cost increases since the last $6.00 increase in price, publishers had hoped that full capacity operation would enable the mills to absorb them. In fact, many users of newsprint had felt that

(Continued on page 22)

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For Atmospheres Containing Hazardous Gas or Inflammable Liquids

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RELIANCE A-C D-C MOTORS

"Motor-Drive is More Than Power"

Paper Outlook

(Continued from page 20)

the current $96.00 price would prove to be the top. There are some indications that newspapers have reached the top in circulation and advertising rates. There are reports of rather severe resistance to recent increases.

Statistics for May show a total U. S. *supply*, for the month, of 446,828 tons —an increase of 9.9% over the same month last year. For five months, the supply has amounted to 2,091,099—an increase of 8.5% over the same period of 1947.

U. S. *consumption* in May was 455,978 tons—up 12.8% from last year. For five months, consumption has totaled 2,131,024 tons—an increase of 11.2% over the same period of last year.

Since consumption exceeded supply, North American *stocks* decreased by 30,000 tons during May. Standing at 615.591 tons at the end of May, stocks were 21,000 tons less than a year earlier.

Boxboard

By STUART EDGERTON
United States Rubber Co.
New York City

The situation continues with practically no change. There is still a heavy demand on boxboard. There continues to be a good supply and prices continue on the same leel. There is some question as to whether the volume in filled orders is as heavy as reported last month.

West Coast Conditions

By HORACE DUCKENFIELD
Metropolitan Life Insurance Co.
San Francisco, Calif.

Reports from paper dealers throughout Northern California would indicate that the situation in the paper industry has been somewhat stabilized over the last few months. It is particularly noted that, in all classes of sulphite, the mills are catching up with the demand.

Rag bonds, as heretofore reported, are in good supply at present, although there has been a recent advance in price owing to cotton scarcity.

All grades of tissues are still difficult to procure.

The situation on bags and wrapping has been definitely affected by the flood conditions in the Pacific Northwest. In fact, these conditions reached a critical stage and it may be some time before the supply of these commodities is stabilized.

The prospect for the second half of the year would indicate that supply, in all classes of merchandise, should be more plentiful and the demand should be very much more easily met.

Canadian Conditions

By J. F. STEPHENSON
Kraft Containers, Ltd.
Hamilton, Canada

It is still recommended that inventory be kept as high as possible. Many things can happen overnight, and surplus stocks can vanish with the dawn, should war or rumors of war again upset our economy.

For the next six months, it is predicted, as an opinion only, that:

1. Prices will remain at their present level.
2. Mills wil slow up production and further improve quality.
3. Demand on certain lines will decrease and some mills will be on shorter hours.
4. Availability of better equipment may even reduce prices by the end of the year, with better man hour production.
5. The mills with good records of service under trying times will get their reward by keeping busy, while the others may not survive competition.
6. Removal of luxury taxes on many products may help to keep the industry busy for the remainder of the year.
7. In general, a slowing up will be noticeable by the end of 1948, unless the situation in Europe gets out of control.

Coast Div. N.A.W.M.D. Dinner Meeting August 2

SAN FRANCISCO — H. L. Green, secretary, Pacific Coast Division, National Ass'n. of Waste Material Dealers, Inc., has called a meeting of that division for August 2 at 7 p.m. at the Palace Hotel.

This will be a dinner-meeting and matters of importance to members on the Pacific Coast will come up for discussion.

Mr. Green anticipates a large attendance from the Los Angeles area, the Northwestern area, and the San Francisco area.

Southern-Southeastern Superintendents Meeting

PISGAH FOREST, N.C.—The Joints Fall Meeting of the Southern Southeastern Divisions of the American Pulp & Paper Mill Superintendents Ass'n., will be held at the Atlanta-Biltmore Hotel, Atlanta, Ga., October 21-23.

Tentative program of the gathering includes the following: Panel Discussion on Labor Relations Within Industry, Austin Fisher, chairman. Papers on that subject and on the following, are also promised: "Chemicals Used in the Paper Industry," "The Southern Newsprint Industry," "Mill Machinery and Equipment," and others to be determined.

Walter Glass will screen the Gaylord Woods film the night of October 21.

Westinghouse Electric Co., has invited those attending the meeting to visit its Atlanta plant the afternoon of October 22.

Guest speaker at the banquet will be Dr. Josiah Crudup, president of Brenau College for Women. Golf for men will be under the direction of Gene Bechard, 3984 Peachtree-Dunwoody road, Atlanta, Ga. Mrs. Claude L. Huey will arrange an entertainment program for the ladies attending.

WILEMAN TO WILKES-BARRE

Crozier S. Wileman has been named as district sales manager of the Link Belt Co., at Wilkes-Barre, Pa., to succeed A. C. Williams, who has retired after 43 years' service.

Taylor and Sims Heading Forest Research Centers

WASHINGTON—Plans for establishment of a Department of Agriculture forest research center at Juneau, Alaska, devoted largely to the needs of the pulp and paper industry, became known officially on July 23, with assignment of Raymond F. Taylor, in charge of the Division of Forestry Management at Northeastern Forest Experiment Station, Philadelphia, Pa., to set up the new station.

For the first time, Congress at the past session provided funds for establishment of such a center to deal with management of Alaskan timber stands. Other stations are to be established in the northeastern part of the country also, under these appropriations.

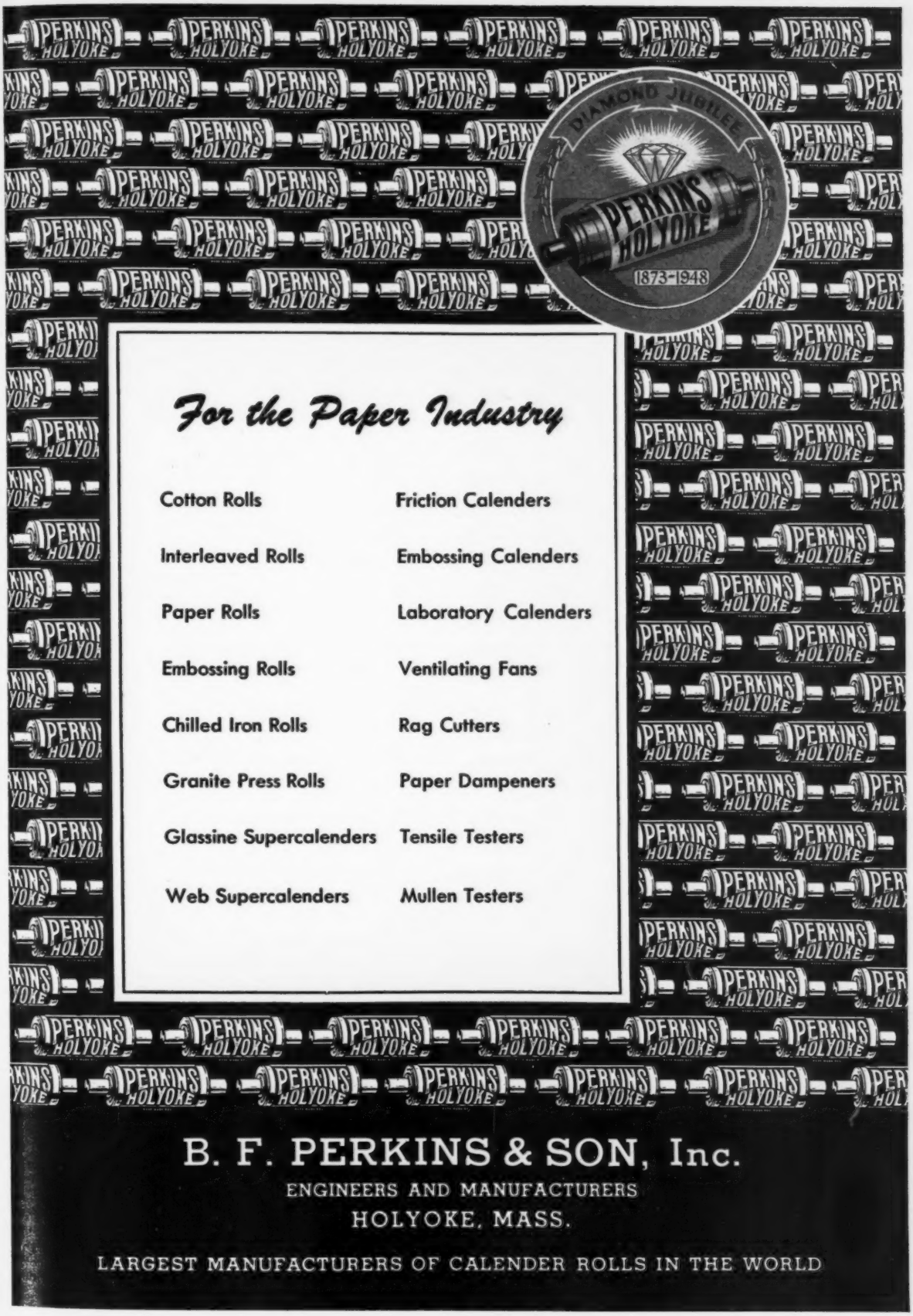
Two new research centers are being established for the area comprising New England, New York, Pennsylvania, New Jersey, Delaware, Maryland and West Virginia, one station to be in Northeastern Pennsylvania and the other in West Virginia. Research for this area will be headed by Ivan H. Sims, who succeeds Mr. Taylor. Mr. Sims was formerly in charge of the Franklin, Va., research station.

N. Y.-Canadian Supts. To Meet at Whiteface

WATERTOWN, N.Y.—The New York-Canadian Division of the American Pulp & Paper Mill Superintendents Ass'n. will hold its annual meeting September 23-25 at Whiteface Inn, Whiteface, N. Y.

John D. Kane of Rochester, N. Y., has been selected as the chairman. Other officers are: O. E. S. Hedbring, first vice-chairman; Donald R. Dick, second vice-chairman; J. O. Julson, third vice-chairman; J. H. Treadwell, secretary; and H. A. Horstmann, treasurer.

A tentative program has been planned and various sub-committees have been chosen to make this meeting successful.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TRENDS

Office of the PAPER TRADE JOURNAL,
Wednesday, July 29, 1948.

A round of U.S. and Canadian newsprint price rises are announced for August 1. What started late in June as a straw in the wind that Canadian producers were considering an advance in price becomes on August 1 an almost general advance which started on the U.S. west coast. The rise, amounting to $4 per ton makes the contract delivered price $100 per ton from most producers, with one increasing his price $3 to make his base zone price $97 per ton. Canadian producers cite the cost of managing forests on a perpetual yield basis as an important factor in rising prices, saying that the price of their product is moderate, and that it would have to rise to $122 to bring it abreast of the rise in U.S. commodity price index. Described as the inevitable result of higher costs of wood supply, labor, fuel oil and transportation, the advance is expected to hit the small and medium-sized papers with special impact inasmuch as the additional cost cannot be passed along to advertisers or circulation without loss.

"Consumption of newsprint continues at an all-time high," the U.S. Dept. of Commerce reports. "Month by month consumption statistics up to the end of May show a steady rise as well as an increase over the corresponding month last year. May consumption of newsprint surpassed that of the corresponding month in 1947 by 15 percent, a slightly higher rise than was registered for the 5-month period. May production for the first time this year exceeded that for the corresponding month of 1947. Domestic production since the beginning of 1948 had shown a tendency to lag behind 1947. The entry of a new machine into commercial production in the South during the first week in April added about 4,000 tons a month to our output. Conversion of two machines in a Pacific Coast mill which was scheduled for completion in June was delayed by the Columbia River flood. Since major shifts of machines from newsprint to other classes of paper have now been completed, domestic production during the the remainder of the year can be expected to exceed that of the first six months. Stocks in the hands of publishers on May 31 amounted to 33 days supply, an increase of 5 days supply compared with the same date last year."

Following the reduction of $16.12 in the per ton control price for newsprint manufactured by British mills, the Newsprint Supply Co. Ltd. reduced the equalized price for lightweight newsprint from $181.35 to $169.26.

The United Kingdom's newsprint consumption by newspapers declined in May to about 32 percent of prewar based on the latest figures reported to Washington. May consumption was at a rate of 355,000 long tons annually. It is expected that figures for the 12-months period ended June, 1948, will show imports from Canada and Newfoundland at 104,000 tons, compared with the 180,000 tons originally planned to be imported. This is attributed to the cut made last year in newsprint consumption by government order.

Latest information on the proposed grant of ECA dollars for the purchase of newsprint from Canada for the U.K. came from London where a leading newspaper reported authorization of Canadian woodpulp for newsprint to the amount of $6,440,500. It is understood that this was not extra wood pulp but that due Britain under contract and which will be paid for under the ECA. This, no doubt, is the allotted $5,500,000 reported from Washington.

While much of the heat which surrounded this controversial issue has abated in both the U.S. and the U.K., the incident served to bring to open emphasis in Britain the lack of newsprint they are enduring. Speaking at the annual meeting of his company recently, Mr. J. L. Cadbury, chairman of the *News Chronicle* urged reconsideration of the priority status given to newsprint, saying that the reason British papers get less than one-third of pre-war supply is because of the low priority given to this particular import compared with other necessary imports. "The question of rearrangement of priorities is entirely in the hands of the Government," he said.

That there are politics as well as dollar shortage wrapped up in the issue seems undeniable from statements made by Mr. Harold Wilson, president of the Board of Trade. Replying to questioning in the House of Commons concerning the Bowater-Hearst arrangement which provided for the manufacture of newsprint in Britain for the U.S. publisher, from Newfoundland lumber, Mr. Wilson said. "This particular programme is being carried out with materials, including sulphite, paid for with American dollars by American newsprint interests; and if we had not done it there would not have been any additional newsprint available in this country. I cannot undertake that the earnings from that program will be allocated entirely to newsprint. The opposition would be the first to complain if we were to cut down food purchases to buy newsprint." Further Mr. Wilson said that he was aware that the British supply of newsprint is far too small. also that there is a world shortage of dollars, and he would not be prepared to recommend that more dollars be allocated to the consumption of newsprint "until we can see the whole dollar situation more clearly."

Background information concerning the Bowater-Hearst deal is that the wood was cut to a special size two years ago in Newfoundland for shipment to England. Because of Government action in connection with the dollar shortage, that intention was not fulfilled, and the timber has been lying in Newfoundland deteriorating ever since. Cut special for export, it could not be used in the plants in Newfoundland. To avoid further loss, negotiations were finally consummated with the Hearst Newspapers and with the approval of the British Government.

In presenting testimony on the newsprint shortage to the Royal Commission on March 4, Mr. Bishop, general manager of the Newsprint Supply Company, said that the acute shortage is the result of policy which may be necessary and right, that it is policy, however, and not scarcity. "Within a reasonable time we could unquestionably obtain our fair share of world supplies of newsprint if we were permitted to do so. We can do that in Scandinavia to a very considerable extent as well as Canada. The shortage might be 20 or 30 percent, if we were able to compete in the world markets," he said.

Cottons

Supplies of new cotton cuttings, relatively meagre at present, are expected to be favorably affected when the operation of the draft law stimulates textile production on behalf of the augmented citizen army, writes the Department. "The demand for new cotton cuttings continues though on a restricted and selective basis in spite of the temporary closure of numerous mills in the fine writing paper category."

The market for old rags continues dull with small demand from manufacturers. In some quarters it is believed that the dullness will continue until after Labor Day.

Indexes

Index of general business activity for the week ended July 17 rose to 152.5 from 147.8 in the preceding week, compared with 142.8 for the corresponding week of 1947.

Index of paperboard production rose to 172.2 from 134.2 in the preceding week, compared with 170.7 in the corresponding week of 1947.

Comparative ratios of U.S. paper and paperboard production to mill capacity as reported by AP&PA are shown below:

	July 17 1948	July 10 1948	July 19 1947	July 20 1946	July 21 1945
Paper*	88.6	62.3	102.8	102.8	89.8
Paperboard ...	84.0	56.0	97.0	94.0	96.0

* Tonnage production was 7.8% greater than last year's although because of a 13.3% increase in 1948 capacity, this year's production ratio is lower.

Paperboard Production Statistics

	For Weeks Ended— July 17 1948	July 10 1948	July 19 1947
Production	157,641	108,114	173,699
New Orders	148,409	123,790	145,615
Unfilled Orders ...	372,739	393,915	474,870
Percent of Activity—Current	84%		
Percent of Activity—Year To Date	98%		

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When you purchase Sutherland Continuous Beaters and Refiners or the Sutherland High Yield Sulphate Process, you get the necessary engineering service to plan the layout for the best results in your mill, plus technicians at the start-up to properly train your operations and maintenance personnel; PLUS continuous service to keep your operations abreast of new Sutherland developments. . . . Quick attainment of performance guarantees is easily accomplished by your regular operating crews; in addition, your satisfaction with the entire installation is guaranteed. We will not accept any orders unless we are sure the results will add to the good reputation we have been building for twelve years. . . . Regardless of whether you make bond, book, news, kraft, tissue or board, your conditions will be improved with Sutherland Refiners operating ahead of your papermachines. . . . May we send you our new catalog, or may we answer your specific questions by mail or a visit?

SUTHERLAND REFINER CORPORATION

TRENTON, NEW JERSEY • *Manufactured in the United States by Valley Iron Works Co., Appleton, Wis.*

SUTHERLAND REFINER LIMITED, 319 DRUMMOND BLDG., MONTREAL, P. Q.

Manufactured in Canada by The John Bertram & Sons Co., Ltd., Dundas, Ontario

IMPORTS

New York, Week Ended July 24th

Newsprint

Pagel Horton & Co., Inc., Ranenfjord, Oslo, 618 rolls.
Daily Mirror, Kermic, Donnacona, 381 rolls.
R. A. Olsen, G. T. D., Donnacona, 378 rolls.
Daily Mirror, Donpaco, Donnacona, 372 rolls.
R. A. Olsen, A. C. D., Donnacona, 384 rolls.
H. G. Craig Co., Newscarrier, Donnacona, 339 rolls.
Quill Publishing Co., Noordam, Rotterdam, 253 rolls.
R. A. Olsen, Ethel Tombs, Gatineau, 309 rolls.

Parchment Paper

George Lippelgoes, Ames Victory, Antwerp, 2 cs.
George Lippelgoes, West Linn Victory, Antwerp, 2 cs.

Wallpaper

Chase National Bank, De Grasse, Havre, 94 cs.
Hudson Shipping Co., De Grasse, Havre, 18 pkgs.

Filter Paper

H. Reeve Angel & Co., Inc., American Inventor, London, 5 cs.

Photopaper

American Express Co., American Inventor, London, 116 cs. (base).

Paperhangings

W. H. S. Lloyd & Co., American Inventor, London, 38 bls., 11 cs.

Printing Paper

Stevens Nelson Paper Corp., Escanaba Victory, Genoa, 13 cs.
Globe Shipping Co., Eseanaba Victory, Genoa, 2 cs.
F.L. Kramer & Co., Washington, Southampton, 1 cs.
The Lafayette Co., Parthia, Liverpool, 8 cs.

Serviettes

(———), Parthia, Liverpool, 18 cs. (Crepe paper).

Tracing Cloth

Defiance Sales Corp., Parthia, Liverpool, 4 cs.

Tissue Paper

B. F. Drakenfeld & Co., Parthia, Liverpool, 12 cs.

Rags, Baggings, etc.

Midwest Waste Material Co., Ames Victory, Antwerp, 59 bls. scrap bagging.
Darmstadt Scott & Courtney, Ames Victory, Antwerp, 245 bls. jute waste.
Chase National Bank, De Grasse, Havre, 49 bls. old bagging.
(———), American Scientist, Glasgow, 65 bls. linen waste, 74 bls. paperstock.
Manufacturers Trust Co., Escanaba Victory, Genoa, 354 bls. old waste bagging.
Chase National Bank, Estrella, Palermo, 215 bls. rags.
Atlas Waste Manufacturing Co., Agwiking, Havana, 14 bls. Cotton waste.
Midwest Waste Material Co., Robert Maersk, Antwerp, 67 bls. scrap bagging.
Ledeboer Co., Robert Maersk, Rotterdam, 138 bls. cotton waste.
American Express Co., Parthia, Liverpool, 13 bls. new wool threads, 112 bls. new wool rags, 21 bls. new hosiery rags.
E. J. Keller Co., Inc., Hibbing Victory, Antwerp, 57 bls. old waste jute bagging.
(———), Hibbing Victory, Antwerp, 62 bls. old waste jute bagging.
Irving Trust Co., Marine Snapper, Genoa, 70 bls. scrap jute paperstock.
Lush Cotton Products Co., Examiner, Cochin, 100 bls. cotton waste.
E. J. Keller Co., Inc., Examiner, Cochin, 100 bls. old jute rags.

Gluestock etc.

Delany & Co., Paula Dan, Buenaventura, 142 bdls. hidecuttings.
Karr Ellis Co., Parthia, Liverpool, 241 bags gluestock.
Transatlantic Animal By-Products Corp., Parthia, Liverpool, 325 bags gluestock.
National City Bank, Marine Snapper, (———), 109 bls. gluestock.

Casein

Hercules Powder Co., Rio Aguapey, Buenos Aires, 1200 bags.
J. H. Schroeder Banking Corp., Rio Aguapey, Buenos Aires, 500 bags.
Tupman Thurlow Co., Rio Aguapey, Buenos Aires, 2000 bags.

Woodpulp

National City Bank, Tornator, Tuppela, 798 bls. prime strong bleachable unbleached sulphite pulp, 2660 bls. prime unbleached kraft sulphate pulp.

Woodpulp Boards

Jay Madden Corp., Mormacsaga, Helsingfors, 117 rolls, 23 bls. (solid white).
National City Bank, Tornator, Hango, 335 rolls, 100 bls. (solid white).

BOSTON

Herman Adlerstein, Escanaba Victory, Genoa, 88 bls. dark cotton rags.
E. J. Keller Co., Inc., Marine Snapper, Genoa, 56 bls. hemp rags.
American Cyanamid Co., Bunker Hill, Buenos Aires, 500 bags casein.

U. S. Imports WOODPULP

Preliminary Figures, June, 1948

	Country of Origin	Short Tons
Mechanically Ground		
Unbleached	Canada	31,997
	Norway	336
	Finland	850
		33,183
Screenings	Canada	
Bleached	No Transactions	
Chemical		
Sulphite, Unbleached	Canada	44,506
	Newfoundland	214
	Sweden	13,489
	Finland	2,182
		60,391
Screenings	Canada	917
Sulphite, Bleached Rayon and Spec. Chem. Gr.	Canada	19,440
	Sweden	2,386
	Norway	1,591
		23,417
Other		
	Canada	20,039
	Sweden	7,894
	Norway	1,140
		29,073
Total	Canada	150,473
	Sweden	56,084
	Finland	3,310
	Norway	3,067
	Newfoundland	214
		213,148

PHILADELPHIA

Herman Adlerstein, Escanaba Victory, Genoa, 133 bls. dark cotton rags.
National City Bank, Tornator, Kemi, 4870 bls. prime strong unbleached sulphite pulp.
E. J. Keller Co., Inc., Examiner, Port Said, 71 bls. old white cotton rags.

BALTIMORE

Madden Reeve Angel & Co., Mormacsaga, Helsingfors, 738 rolls newsprint.
Cleveland Trust Co., Molda, Rouen, 80 rolls newsprint.
(———), Ames Victory, Antwerp, 156 rolls newsprint.

NORFOLK

A. de Vries Trading Corp., West Linn Victory, 61 bls. scrap bagging.
F. P. Gaskell Co., American Scientist, Glasgow, 32 cs. coated paper for cigarette tips.

Czechs Exceed Planned 1947 Production Goal

WASHINGTON—Czechoslovakia is reported to have exceeded planned 1947 production goals for chemical pulp, paper and paper board, under the two-year 1947-48 plan put into effect by the Government. Production of chemical pulp was 235,210 metric tons, 114.7 percent of the goal; paper, 227.090 tons, 115.3 percent; and paperboard, 72,230 tons, 122 percent. On the other hand, mechanical pulp production amounting to 57,300 tons was 61.3 percent of planned output.

The Czech paper industries, with an overall attainment of 113 percent of the 1947 target, led other industries in meeting the plan objectives, it was stated.

Norway Interest in Synthetic Resin Production Increasing

WASHINGTON—Increasing interest in synthetic resins production is reported from Norway, which has established through the Technical Natural Science Research Council a grant for study of synthetic resin production in the United States by Norwegian engineers.

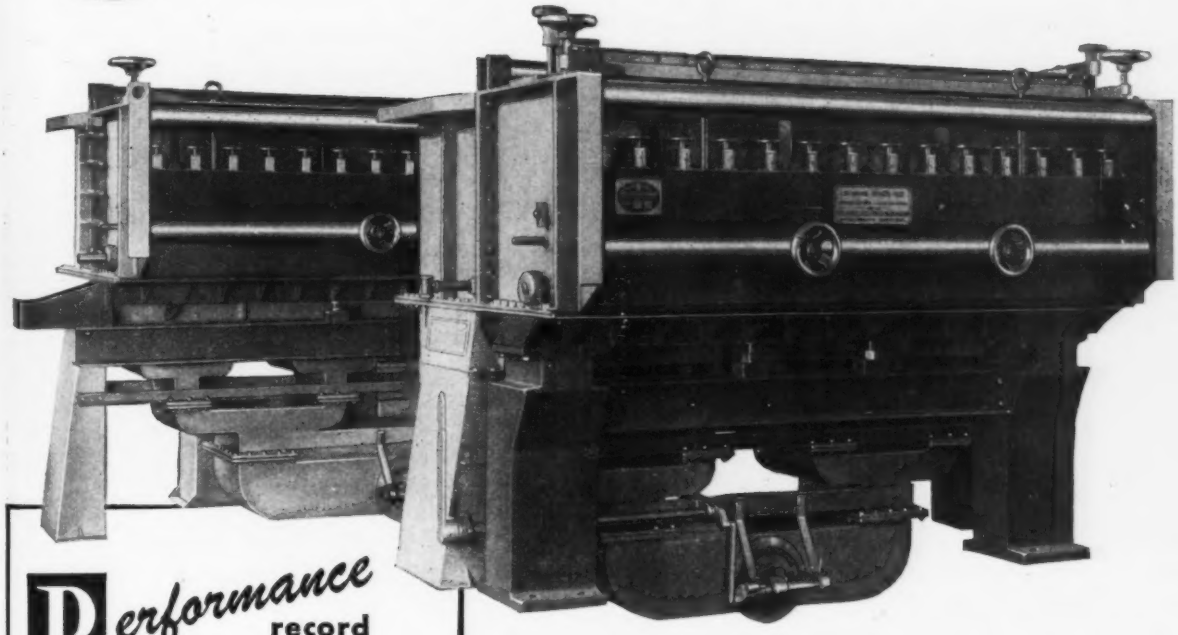
It is added that a new factory for synthetic resins output is being constructed at Liliestrom, Norway, to have an estimated capacity sufficient for home demands and provide an exportable surplus. Necessary phenol supplies must be imported for some years meanwhile, it was stated on July 23.

Jap Newsprint Output Up —Korean, Dwindling

WASHINGTON — Japanese newsprint production in 1947 is reported at 99,615 short tons, compared with 83,262 tons the previous year, by the military government there. Production last year was approximately 62 percent of effective capacity of all newspaper mills, and 45 percent of estimated installed capacity.

A comparable report on Korea's U.S. zone showed production of machine-made paper totaled 3,212 metric tons, against 3,884 tons in 1946, the decline being attributed chiefly lack of pulp and the shortage of electric power.

Uniform pond-to-wire delivery with Sandy Hill flow control units



Performance record

1. Speed stepped up 20%.
2. Produces wider sheet in relation to slice width
3. Makes superior looking sheet
4. Spread under dandy is more uniform
5. Immediately increases use of water in the sheet
6. Good supercalender operation with paper produced at increased speed

THESE Sandy Hill flow control units are widely adaptable. They are adjustable to both high and low slices and equally good results are gained at high or low speed, or when a secondary slice is desirable.

Built into these units are the acclaimed advantages of two Sandy Hill products—the Bertrams Flow Distributors and the Neilson Slice. With these flow control units, paper may be made with the finest of caliper control and fiber distribution.

The slice may be pivot-carried, allowing advancement or retraction. Units come custom built, and are available for use with either deckle straps or ruler edge deckles.

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Hudson Falls, N. Y.

Machinists and Founders Specializing in Paper and Pulp Mill Machinery

Manufacturers of

Adjustable Cylinder Vats
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Pulp Grinders
Dandy Roll Drives
Pulpers or Kneaders, Voith
Thickeners
Quick Opening Gate Valves
Bertrams Flow Distributors
Bertrams Shakers
Neilson Slice
Feltless Wet Machines
"Selective" and Corner Drives
Fourdinier Paper Machines
"Packer" Screens
Castings
Bleaching Equipment
Scofield Felt Conditioners
Cleveland Type Bearings
Shaker Screens

PRICES

Quotations indicate trends in an open market. At the moment they can be of little more value. While some volume business still is done under contract at the figures shown, fluctuations are too varied and frequent to permit prices to be interpreted as representing a wholly stabilized market.

NEW YORK

Paper

(Delivered New York)

Effective August 1.

Standard News, per ton—

Rolls, contract	$96.00/100.00
Sheets	111.00/ —

Kraft—per cwt.—Carload Quantities Zone A Deld. 40 lb. base wgt.

Superstandard Wrapping	$9.00/ —
No. 1 Wrapping	7.25/ 8.00
Standard Wrapping	6.50/ —
Standard Bag	6.50/ —

Tissues—Per Ream 24x36 (480) 11 lbs. Zone 1.

Wh. No. 1 Frd.	$1.84/$2.00
Wh. No. 1 M. G.	1.94/ 2.00
Wh. No. 1½	1.60/ —
Wh. No. 2	1.75/ —
Kraft Anti-Tar	1.65/ —
Kraft Unbl.	1.85/ —
Manila No. 2	1.62/ —
Shred. Wh. No. 1 cwt.	1.10/ 1.50

Toilet—Per Case of 100 rolls—1 M Sheets.

Unbleached	$8.50/$10.00
Bleached	8.50/ 10.00

Paper Towels—Per Case of 3750—Zone 1.

Wh. Jr. M'tif'd 9¼x9½	$5.15
Br. Sr. M'tif'd 10x12	3.60
Br. Jr. M'tif'd 9½x9¾	3.10
Br. Jr. Sgl. fold 10x10¾	3.15

Manila—per cwt.—C-1 f.a.

No. 1 Jute Tag	$14.50/ —
Reg. Jute Manila	13.25/$15.50
No. 1 Manila	9.75/ —
5 lb. Manila	10.75/ 11.25

Boards, per ton—

Plain News	$92.50/ —
Filled News	94.00/ —
Plain Chip	90.00/ —
Sgl. Mla. L-d. Chip*	100.00/102.50
White Pat. coated*	120.00/ —
Kraft Liners 42 lb.	100.00/ —
Kraft Corr. .009	105.00/ —
Binders Boards	126.00/ —

* Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following prices are representative of distributors' resale prices, all deliveries in Zone 1:

Rag Content Bonds and Ledgers—

White, 16 lb.

Bonds, per cwt.

	Carton 4 C't'n	Ton
100% Rag Ext. No. 1	$55.00 $50.80	$48.70
100% Rag	48.25 44.55	42.70
75% Rag	37.50 34.55	33.10
50% Rag	32.25 29.40	28.25
25% Rag	28.75 26.15	25.10

Ledgers, per cwt.

100% Rag Ext. No. 1	$55.00	$50.80	$48.70
100% Rag	48.25	44.55	42.70
75% Rag	37.50	34.55	33.10
50% Rag	32.25	29.40	28.25
25% Rag	28.75	26.15	25.10

Sulphite Bonds and Ledgers—

White, 16 lbs.

Bonds, per cwt.

No. 1	$21.25	$19.25	$18.50
No. 2	20.25	18.30	17.55
No. 4	19.25	17.55	16.85

Ledgers, per cwt.

No. 1	$21.75	$19.65	$18.85
No. 2	20.75	18.75	18.05
No. 4	20.00	18.10	17.35

Free Sheet Book Papers—

White, Cased Paper

	(Per cwt.) Case	Ton
No. 1 Glossy Coated	$20.40	$19.50
No. 2 Glossy Coated	19.15	18.30
No. 3 Glossy Coated	18.40	17.60
No. 1 Antique (Watermarked)	15.90	15.15
No. 2 Offset	15.15 to 17.90	14.60 to 17.10
A Grade E. F.	14.90	14.25
A Grade S. & S. C.	15.40	14.65
B Grade E. F.	13.90	13.30
B Grade S. C.	14.40	13.70

Wood Pulp

Domestic mill contract prices delivered with varying freight allowances.

	Per Short ADT
Groundwood	$80.00/$81.00
Unbleached Sulphite	124.00/ —
Bleached Sulphite	125.00/135.00
Bleached Soda	130.00/ —
Bleached Sulphate	175.00/185.00
Unbleached Sulphate Northern	125.00/155.00
Unbleached Sulphate Southern	130.00/145.00

Canadian Quotations

Prices delivered with varying freight allowances unless otherwise specified:

	Per Short ADT
Bleached Sulphate	160.00/185.00
Unbleached Sulphate	125.00/150.00
Unbleached Sulphite	125.00/126.00
Bleached Sulphite	125.00/135.00
Glassine Unbleached Sulphite (no freight allowance)	120.00/ —
Bleached Soda	130.00/ —
Groundwood	80.00/ 85.00
Sideruns Pulping News	80.00/ 90.00
Hardwood and Specialty Grades	Nominal

* Note—Above quotations are correct. Those published in July 1 issue were incorrect.

Swedish Quotations

On dock, Atlantic Ports

Bleached Kraft	185.00/ —
Bleached Sulphite	185.00/ —
Unbleached Sulphite	155.00/157.50
Unbleached Kraft	147.50/ —

Finnish Quotations

On dock, Atlantic Ports

	Per Short ADT
Bleached Sulphite	$187.50/ —
Unbleached Sulphite	155.00/157.00
Unbleached Sulphate	147.50/ —

New Domestic Cotton Cuttings

(F.o.b. Ship. Pt. Plus Dealer's Commission)

White Shirt	$11.50/$12.00
Unbleached Muslin	12.00/ 12.50
Light Silesias	9.00/ 9.25
White Back Blue Overalls	9.00/ 9.50
Blue Overalls	8.00/ 8.25
Fancy Shirt	6.00/ 6.25
Light Percales	8.50/ 8.75
Light Prints	7.50/ 7.75
No. 1 Washables	5.00/ 5.25
Bleachable Khaki	7.50/ 8.00
Unbleachable Khaki	6.50/ 7.00
Cottonades	5.50/ 5.75

Old Domestic Cotton Rags

(F.o.b. Ship. Pt. Plus Dealer's Commission)

	Per 100 lbs.
No. 1 Whites Repacked	$5.50/ $6.00
No. 1 Whites Miscellaneous	4.50/ 5.00
No. 2 Whites Repacked	3.50/ 3.75
No. 2 Whites Miscellaneous	3.00/ 3.50
Blue Overalls	3.75/ 4.00
Thirds and Blues Repacked	3.25/ 3.50
No. 1 Roofing Rags	1.70/ 1.80
No. 2 Roofing Rags	1.60/ 1.70
No. 3 Jute Bagging	1.50/ 1.60
No. 4 Brussels and hard back carpets	1.50/ 1.60
No. 5A Roofing Rags	1.50/ 1.60

New Foreign Cotton Cuttings

(Prices to Mill, F.o.b. Dock, N. Y.)

	Per 100 lbs.
New Dark Cuttings	$5.50/ $5.75
New Mixed Cuttings	6.25/ 6.50
Light Silesias	9.25/ 9.50
Light Flannelettes	9.25/ 9.50
New White Cuttings	12.00/ 13.00
New Unbleached Cuttings	12.25/ 13.00
Fancy Shirt Cuttings	6.50/ 7.00
Light Prints	7.75/ 8.00
Bleachable Khaki, No. 1	7.00/ 7.50
Unbl. Khaki, No. 1	6.25/ 6.75

Old Foreign Rags

(Prices to Mill, F.o.b. Dock, N. Y.)

	Per 100 lbs.
No. 1 White Linens	nominal
No. 2 White Linens	nominal
No. 3 White Linens	nominal
No. 4 White Linens	nominal
No. 1 White Cottons	8.00/ 10.00
No. 2 White Cottons	7.00/ 8.00
No. 3 White Cottons	6.00/ 6.50
No. 4 White Cottons	4.00/ 4.50
Extra Light Prints	6.50/ 7.00
Old Light Prints	4.50/ 5.00
Med. Light Prints	4.00/ 4.50
Dutch Blue Cottons	5.25/ 5.50
Checks and Blues	4.00/ 4.25
Linsey Garments	2.35/ 2.50
Dark Cottons, European	2.30/ 2.35
Dark Cottons, Egyptian	3.25/ 3.50
Old Shopperies	2.20/ 2.30
New Shopperies	2.25/ 2.30

Bagging

(Prices to Mill, f.o.b. N. Y.)

	Per 100 lbs.
Foreign Gunny, No. 1	$6.75/ $7.25
Domestic Gunny, No. 1	6.75/ 7.25
Heavy Wool Tares	6.25/ 6.50
No. 1 Scrap Baggings	5.50/ 5.75
Roofing Bagging	1.50/ 1.75
Foreign Manila Rope	6.00/ 6.75
Domestic Manila Rope	6.50/ 6.75
Jute Strings	5.00/ 5.25
No. 1 Sisal Strings	5.25/ 5.50
Mixed Strings	1.75/ 2.50

Waste Paper

Base Prices to Mills for Average Packings F.o.b. New York, Baled

	(Per Ton)
No. 1 Hd. Wh. Env. Cts, one cut	$155.00/$165.00
No. 1 Hard White Envelope Cuts	145.00/ 155.00
No. 1 Hd. Wh. Shavings, unruled	140.00/ 150.00
No. 1 Hd. Wh. Shavings ruled	110.00/ 130.00
Soft White Shavings, one cut	140.00/ 150.00
No. 1 Soft White Shavings	125.00/ 135.00
Soft White Shavings, Misc.	115.00/ 125.00
No. 1 Fly Leaf Shavings	45.00/ —
No. 1 Gd'wd Fly Leaf Shavings	35.00/ —
No. 1 Heavy Books & Magazines	23.00/ 24.00
Mixed Books	15.00/ 18.00
No. 1 White Ledger	75.00/ 80.00
Col. Ledger	50.00/ 55.00
Manila Tab. Cards	90.00/ 95.00
New Man. Env. Cuttings, one cut	100.00/ 110.00
New Manila Envelope Cuttings	65.00/ 75.00
Extra Manilas	25.00/ 30.00
Mxd Kraft, Env. & Rag Cuttings	75.00/ 85.00
Kraft Envelope Cuttings	100.00/ 110.00
Triple Sorted, No. 1 Brown Soft Kraft	65.00/ 75.00
New Kraft Corrugated Cuttings	70.00/ 75.00
No. 1 Assorted Old Kraft	50.00/ 55.00
New Jute Corrugated Cuttings	27.00/ —
Old 100% Kraft Corr. Containers	35.00/ 40.00
Old Corrugated	19.00/ 21.00
No. 1 News	11.00/ 12.00
No. 1 Mixed Papers	8.00/ 9.00
Box Board Cuttings	8.00/ 9.00
White Blank News	75.00/ 85.00
Overissue News	16.00/ 17.00
Mill Wrappers	20.00/ 22.00

Twines

All Prices Nominal, F.o.b. Mill

(Soft Fiber)

Coarse Polished—India	.35¼/ .36½
Fine Polished Fine India	.41¼/ .45
Unpolished—Paper Makers	.32 / .35½
Tube Rope	.33¼/ .35¼
Wrapping	.37 / .39
Cotton	.63¼/ .66¾

(Hard Fiber)

Mex. Sisal	.21 / .27
Manila (Reprocessed)	.30 / .32

(American Hemp)

Polished Hemp	.36¾/ .60
Unpolished	.32¼/ .54

PHILADELPHIA

Domestic Rags (New)

(F.o.b. Eastern Shipping Point)

Shirt Cuttings—	
New White No. 1	.10½/ .11
New White No. 2	nominal
Light Silesias	.07½/ .08
Black Silesias, soft	.06 / .06½
New Unbleached	.10½/ .11¼
Washable Prints	.06½/ .07
Washable No. 1	.05 / .05½
Blue Overall	.07½/ .08
Cottons—According to grade—	
Washable Shredding	.03 / .03½
Fancy Percales	.06¾/ .07¼
New Black Soft	nominal
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.05¾/ .06½
Bleachable Cotton Cuttings	.06½/ .07
Men's Corduroy	.05½/ .06
Ladies' Corduroy	.05 / .05½
Cottonades	.05½/ .06

Domestic Rags (Old)

(F.o.b. Eastern Shipping Point)

White No. 1—Repacked	4.50 / 5.00
Mixed White	4.00 / 4.25
White No. 2—Repacked	3.50 / 3.75
Thirds and Blues—	
Miscellaneous	2.50 / 2.75
Repacked	3.00 / 3.25
Roofing Stock—	
Foreign No. 1	nominal
Domestic No. 1	1.65 / 1.70
Domestic No. 2	1.55 / 1.60
Roofing Bagging	1.45 / 1.50
Old Manila Rope	5.75 / 6.00

(Continued on page 30)

A useful guide to better results with Stainless

Here in convenient form we have condensed the essential facts about the various grades of U·S·S Stainless Steel that will assist you in determining broadly which is most suitable for your needs. Keep in mind, however, that this chart merely indicates general characteristics and basic applications.

To get *optimum* results from these service-tested Stainless Steels, any fabricator, and especially any one contemplating the use of Stainless for a new product, should obtain expert advice in its selection and fabrication. This we are prepared to furnish.

Our Stainless engineers are specialists in the use of these materials. Ask for their cooperation. You'll find their suggestions practical and extremely helpful not only in determining the grade of U·S·S Stainless that will do the best job for you, but in showing how it can be handled most efficiently on your equipment.

15 types of U·S·S Stainless Steel to choose from

	grade	characteristics	when or why used
austenitic	U·S·S 18-8 Type 302	Excellent corrosion resistance.	General all-purpose grade for food, dairy, chemical, and architectural uses.
austenitic	U·S·S 18-8 S Type 304	Carbon is limited to 0.08% maximum.	For applications similar to U·S·S 18-8 Type 302, but offers superior corrosion resistance in weld-affected areas.
austenitic	U·S·S 18-8 Ti Type 321 U·S·S 18-8 Cb Type 347	Similar in general corrosion resistance to U·S·S 18-8 and U·S·S 18-8 S. Stabilizing additions immunize corrosion attack of heat-affected areas.	High temperature service, 800°F to 1600°F. For severe corrosion conditions in welded assemblies which cannot be subsequently annealed.
austenitic	U·S·S 18-8 Mo Type 316	Exceptional corrosion resistance, improved creep strength.	Severe corrosive conditions, particularly those involving pit-type corrosion.
austenitic	U·S·S 18-8 FM Type 303	Galling and seizing reduced greatly in machining.	Gears, valves, bolts, screws, or other machined products.
austenitic	U·S·S 25-12 Type 309	Exceptionally stress resistant at high temperature exposure.	In service where temperatures up to 1900°F are encountered.
austenitic	U·S·S 25-20 Type 310	Offers superior resistance to oxidation.	Applied where very high temperatures are involved.
ferritic	U·S·S 17 Type 430	Good corrosion resistance.	Automotive trim and interior architectural trim.
ferritic	U·S·S 27 Type 446	Limited formability, generally not adapted to severe drawing. Excellent scaling resistance.	Principally used at high temperatures up to 2000°F for static parts not subjected to high stress.
ferritic	U·S·S 12 Type 410	Martensitic grade, strengthened by conventional heating and quenching.	Engaging mechanical parts, such as pump rods and valves.
ferritic	U·S·S 12 Turbine Type 403	Composition basically same as U·S·S 12.	Modified analysis suited for turbine blades and similar application.
ferritic	U·S·S 12 AL Type 405	Composition basically same as U·S·S 12.	Modified analysis for applications requiring field welding where air-hardening cannot be corrected by heat treatment.
ferritic	U·S·S 12 FM	Added elements give extra machinability over U·S·S 12.	Used for valve parts and other articles made on automatic machines.
ferritic	U·S·S 5 Type 501	Welding hardens; annealing restores ductility.	Used in petroleum industries for strength, and resistance to corrosion and oxidation at moderately high temperatures.
ferritic	U·S·S 5 S Type 502	Basically same as regular U·S·S 5.	Modified analysis reduces tendency to weld-harden.

forms available

SHEETS are supplied in plain or polished finishes which are standardized. They are designated as: No. 1—Hot Rolled, Annealed, and Pickled; No. 2D—Dull Cold Rolled; No. 2B—Bright Cold Rolled; No. 4—Standard Polish on either One or Both Sides; No. 6—Tampico Brushed; No. 7—High Luster Polished.

STRIP is supplied to ordered requirement in coils or straightened and cut lengths. It should be ordered to a decimal thickness, with width and finish to suit the particular application.

PLATES AND BARS are furnished hot rolled, annealed, and pickled; bars are also furnished cold finished, centerless ground, or polished. Special sections and plates are furnished with pickle finish and require coarse abrasives in preliminary grinding, where a polish is desired.

TUBULAR PRODUCTS are furnished in most popular grades of U·S·S Stainless Steel. A variety of finishes are obtained by grinding and polishing cold drawn, annealed, and pickled tubing.

ROUND WIRE is available in coils within a size range of .5" to .005" inclusive. Straightened and cut material is limited to .030" and coarser. Finishes available include pickled, metallic coated, oil, diamond, and soap drawn, ground, and polished. A variety of cold heading wire, spring wire, weaving wire, armature binding wire, and wire rope are also available in stainless steels.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO · NATIONAL TUBE COMPANY, PITTSBURGH
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

UNITED STATES STEEL

PRICES CONTINUED FROM PAGE 28

Bagging
(F.o.b. Eastern Shipping Point)

Gunny No. 1—	
Foreign	nominal
Domestic	5.00 / 5.50
No. 1 Clean Bright—	
Sisal Strings	.04½/ .05
No. 2 Clean Bright—	
Sisal Strings	.03½/ .04
Sisal Jute	.02¼/ .03
Scrap—	
No. 1	5.00 / 5.50
No. 2	2.50 / 3.00

Old Papers
F.o.b. Phila. Mill Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	$100.00/$115.00
No. 1 Hard White Shavings, unruled	100.00/ —
Soft White Shavings	80.00/ —
White Blank News	65.00/ 70.00
Soft White Shavings, One Cut	/ 80.00
No. 1 White Ledger	65.00/ 70.00
No. 1 Heavy Books & Magazines	20.00/ 22.00
Overissue Magazines	nominal
New Manila Envelope Cuttings	75.00/ —
No. 1 Assorted Old Kraft	35.00/ 40.00
No. 1 Mixed Paper	8.00/ 10.00
Box Board Cuttings	8.00/ 10.00
Kraft Corrugated Cuttings	75.00/ 80.00
Old Corrugated	20.00/ 24.00
Overissue News	13.00/ 15.00
No. 1 News	10.00/ 12.00

BOSTON

Old Papers
F.o.b. Phila. Mill Prices, Baled

No. 1 Hard White Shavings, unruled	$6.25 /$6.75
No. 1 Hard White Shavings, ruled	6.00 / 6.50
Soft White Shavings, Misc.	6.00 / 6.25
No. 1 Fly Leaf Shavings	— / —
No. 2 Fly Leaf Shavings	4.25 / —
No. 1 Grdwd. Fly Leaf Shvgs.	1.75 / 2.00
No. 2 Groundwood Fly Leaf Shavings	1.50 / 1.75
Mixed Colored Shavings	2.00 / 2.25
New Manila Env. Cuts, one cut	4.50/ / 4.75
Hard White Envelope Cuts, one cut	7.00 / —
Triple S'ted No. 1 Br. Soft Kraft	3.75 / 4.00
Mixed Kraft Env. & Bag Cuttings	4.00 / 4.25
Kraft Envelope Cuttings	5.00 / 5.50
No. 1 Heavy Books & Magazines	1.75 / —
New Manila Env. Cutt'gs, one cut	—/ /
New Manila Envelope Cuttings	4.00 / 4.25
White Tabulating Cards	5.00 / —
Groundwood Tabulating Cards	1.50 / 1.75
White Blank News	2.25 / 2.50
No. 1 Assorted Old Kraft	3.50 / 4.00
No. 1 Mixed Paper	.47½/ —
Overissue News	.90 / 1.00
No. 1 News	.55 / .60
Box Board Cuttings	.60 / .70
New Corrugated Cuttings, Kraft.	2.75 / 3.00
Old Kraft Corrugated Containers	2.00 / 2.25
Old Corrugated Containers	— / 1.10
Jute Corrugated Cuttings	1.07½/ —
Paper Strings	2.00 / 2.25

Bagging
(F.o.b. Boston)

Gunny Bagging—	
Foreign	(nominal)
Domestic	7.00 / —
Sisal Rope No. 1	6.25 / —
Sisal Rope, No. 2	5.50 / —
Mixed Rope	3.00 / —
Mixed Strings	1.60 / —
Transmission Rope—	
Foreign	nominal
Domestic	3.00 / 3.50
Manila Rope—	
Foreign	nominal
Domestic	6.75 / —
Jute Carpet Threads	6.00 / —
Bleachery Burlap	— / 7.00
Scrap Burlap—	
Foreign	6.00 / 6.25
Domestic	6.00 / 6.25
South America	6.00 / 6.25
Wool Tares	
Foreign	6.25 / —
Domestic	6.25 / —
Austr. Wool Pouches	7.50 / —
New Zealand Wool Pouches	7.50 / —
New Burlap Cuttings	6.50 / —
Heavy Baling Bagging	5.25 / 5.75
Paper Mill Bagging	5.50 / 5.75
No. 1 Roofing Bagging	2.25 / 2.50

Domestic Rags (New)
(F.o.b. Boston)

Shirt Cuttings—	
New Light Prints	.07½/ —
Fancy Percales	.08 / —
New White No. 1	.11 / .11¼
New Light Flannelettes	.08 / .08½
Canton Flannels, Bleached	.10 / .11
Underwear Cutters, Bleached	.11½/ —
Underwear Cutters, Unbleached	.11 / .12
Silesias No. 1	.08 / .08½
New Black Silestas	.04½/ —
Red Cotton Cuttings	.05 / —
Blue Overalls	— / .08½
Soft Unbleached	.11 / .12
Blue Cheviots	.08½/ .09
Fancy	.06 / —
Washable	.06 / —
Khaki Cuttings	.06½/ .07½
Corduroy	.03½/ —
Men's Corduroy	.04 / —
Khaki Canvas	— / .06
B. V. D. Cuttings	.11½/ —

Domestic Rags (Old)
(F.o.b. Boston)

White No. 1—	
Repacked	5.00 / 5.50
Miscellaneous	4.50 / 5.00
White No. 2—	
Miscellaneous	2.65 / —
Twos and Blues, Repacked	2.75 / —
Old Blue Overalls	4.00 / 4.50
Thirds and Blues, Repacked	2.20 / —
Miscellaneous	1.80 / —
Black Stockings	3.50 / 4.00
Roofing Stock—	
No. 1	1.70 / —
No. 2	1.60 / —
No. 3	1.50 / —
No. 4	1.50 / —
No. 5, Quality A.	1.60 / —
Quality B.	1.50 / —
Quality C.	.95 / —
Old Manila Rope	6.00 / —

Foreign Rags
(F.o.b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper
(F.o.b. Chicago) Mill Prices, Baled

Shavings—		
No. 1 Hard White Envelope cuts, one cut	$150.00/	—
No. 1 Hard White Shavings, unruled	140.00/	—
No. 1 Soft White Shavings	120.00/	—
No. 1 White Ledger	85.00/	—
No. 1 Heavy Books & Magazines	35.00/	—
White Blank News	80.00/	85.00
Mixed Kraft Env. & Bag Cuttings	90.00/	110.00
No. 1 Assorted Old Kraft	35.00/	—
Overissue News	24.00/	—
No. 1 News	11.00/	—
No. 1 Mixed Paper	11.00/	—
Old Corrugated	23.00/	—
Mill Wrappers	17.00/	—

MARKETS

Blanc Fixe
Prices firm following price rise. Demand strong. Pulp is currently quoted at $87.00 in bags, car lots at works, 6 cents per pound, l.c.l., deld.; by-product $77.50 per ton, car lots, at works, 6 cents per pound, l.c.l., deld.

Bleaching Powder
Supply adequate. Delivery good. Shortage of shipping containers restricts export. Prices range from $4.25 to $4.50 per 100 pound drums, l.c.l. works.

Casein
Demand dull. Domestic supply limited, with shortage foreseen by September. Prices steady. Current prices on processed acid precipitated casein at 31 to 33 cents per pound for domestic grades and 28¼ to 29½ cents for imported grades, f.o.b. shipping point.

Caustic Soda
New strike likely to keep output tight through year. Solid caustic is reported at $3.10 per cwt.; flaked and ground is quoted at $3.50 per cwt. in 400 pound drums, $4 to $4.25 per cwt. in 100 pound drums—car lots at works; liquid 50 percent in tank cars at $2.50 per cwt.; liquid 73 percent in tank cars at $2.60 per cwt., at works.

China Clay
Supply excellent. Demand steady. Domestic filled clay is $9 to $11.50 per ton, car lots; coating clay is $14 to $22. Imported clay quotation, short tons, $16 to $35, export warehouse.

Chlorine
With another plant strike bound, supply is tight. Heavy summer demand and shortage of tankers aggravates situation. Currently quoted at $2.40 per cwt. in single unit tank cars; at $2.70 to $3.90 per cwt., in multi-unit tank cars, f.o.b., works.

Rosin
Domestic and foreign buying dull. Increasing quantities going under loan. Gum rosin in drums per 100 pounds net in car lots, f.o.b. Savannah; B, $6.50; G, $7.25; H, $7.31; I, K, $7.32. Wood rosin per 10 0pounds net, car lots, f.o.b. Savannah; B, $5.00; FF, $6.50.

Rosin Size
Seventy percent gum and pale wood grades. Supply ample. Demand good. Tank cars, $6.15 to $6.25, f.o.b. southern shipping point.

Salt Cake
Demand continues ahead of supply with slight improvement in shipments. Production under contract. Domestic salt cake is quoted at $25 to $28.

Soda Ash
Supply continues to ease. Deliveries close to schedule. Export likely to expand. Current prices, car lots, per 100 pounds; in bulk, $1.15; in paper bags, $1.40; and in barrels, $1.90.

Sodium Bicarbonate
Strong demand with supply good. Reported as $1.95 per cwt. paper bags, carload lots.

Starch
Supply good. Easy demand against contracts. Prices steady. Pearl grade quoted at $7.00 per 100 pounds; powdered starch at $7.12 per 100 pounds; car lots, New York.

Sulphate of Alumina
Demand increased. Supply steady. The commercial grades are quoted at from $1.30 per 100 pounds, in bags, car lots, f.o.b. works. Iron free is $2.50 per 100 pounds in bags, car lots, at works.

Sulphur
Production shows heavy gain. Prices unchanged. Supplies ample. Annual contracts are quoted at $16 to $18 per long ton, f.o.b. mines; the price f.o.b. at Gulf ports is $17.50 to $19.50 per long ton.

Talc
Demand continues far in excess of supply. Prices steady. Domestic grades are currently quoted at $23 per ton in paper sacks, f.o.b. mills; Canadian at $35 and up per ton. All prices in cart lots.

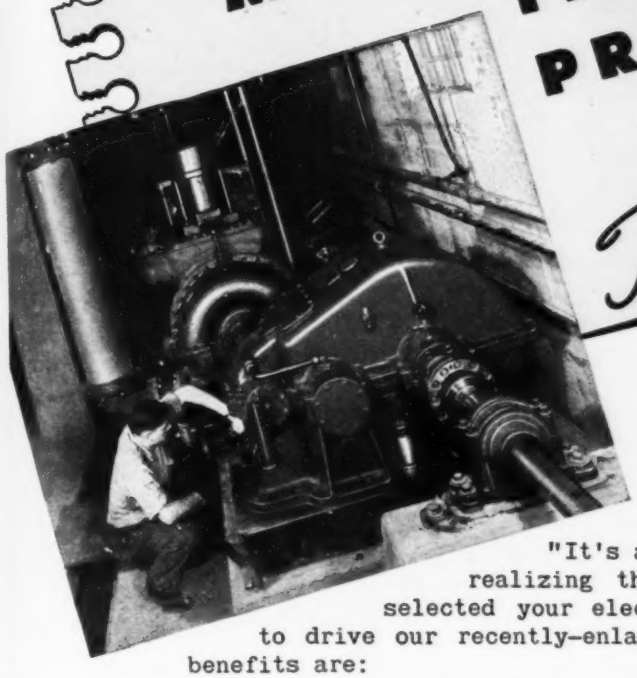
Titanium Dioxide
Demand continues extremely tight with no early improvement seen. Shipments on allocation. Anastase 17½-18c pound carload lots, 18-19c l.c.l., rutile, 19½-20c pound carload lots, 20-21c l.c.l.; 50-pound bags, f.o.b. plant, minimum freight allowance.

Parsons Olympics Contestant

WASHINGTON — Frank T. Parsons, Jr., president of the Frank Parsons Paper Co., has sailed from New York for London where he will participate in the Olympic games. Mr. Parsons, who has been winning ribbons for marksmanship since his college days, will represent this country through the National Rifle Ass'n.

...the record shows!

MICHIGAN PAPER INCREASES PRODUCTION with G-E Turbine Drive!



Here's what Mr. Dwight L. Stocker, President of the Michigan Paper Company, Plainwell, Michigan, has to say about this G-E 300-hp turbine drive:

"It's a pleasure to tell you that we are realizing the benefits anticipated when we selected your electrically-governed steam turbine to drive our recently-enlarged No. 4 paper machine. These benefits are:

1. Accurately maintained speed eliminates one of the variables in paper making. The machine tenders are free to control the other variables.
2. Preset running-speed control permits running the machine at the proper speed for maximum output and highest quality.
3. Preset control of machine wash-up and wire-souring speeds, with the control dial behind a locked door, eliminates variations in the speeds of these operations, other than those selected by the mill management. We believe this will increase wire life, reducing costs and increasing production.
4. Push-button selection of speed relieves the operator from the necessity of watching a tachometer on different operations. Thus he is free to give proper attention to other adjustments on the machine.

In general, we find this machine much easier to control than our other machines. In addition, we find our over-all steam balance is somewhat better than anticipated".

General Electric turbine drives can help you lower operating costs, step up production. If your machines require highly reliable drives with accurate speed control, why not have experienced G-E engineers help you in application of the right drive?
Get in touch with your G-E Apparatus Sales Office, or write Apparatus Department, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

FINANCIAL RECORD

	Per Share Earnings 1947	12 Mos. to Approx. 3/31/48	Indic. Annual Divid. Rate	July 28 Closing Market Price
Preferred Stocks				
Armstrong Cork Co. $3.75 Cum.	$59.74		$3.75	96¾
Armstrong Cork Co. $4.00 Cum. Conv.	25.85		4.00	113
Celotex Corp. 5% Cum.	24.25c	$25.99f	1.00	
Champion Paper & Fibre $4.50 Cum.			4.50	
Container Corp. of Amer. 4% Cum.	102.74	88.25j	4.00	
Crown Zellerbach $4.20 Cum.	56.40i		4.20	100
Crown Zellerbach $4.00 Cum. Conv. 2nd	211.39i		4.00	117
Dixie Cup Co. $2.50 Cum. Conv. Cl. A	9.16		2.50	
Flintkote Co. $4 Cum.	81.91	81.06	4.00	
Robert Gair Co. Inc. 6% Cum.	18.01	17.72	1.20	
International Paper Co. $4 Cum.	236.51	243.69	4.00	95½
Johns Manville $3.50 Cum.	128.81	134.48j	3.50	
Kimberly Clark Corp. 4½% Cum.	70.03		4.50	
Kimberly Clark Corp. 4% Cum. Conv. 2nd	95.88		4.00	103¼
MacAndrews & Forbes 6% Cum.	62.20	62.56j	6.00	
Mead Corp. 4¼% Cum.	81.56	79.88	4.25	38¾
Mead Corp. 4% Cum. Conv. 2nd	53.34	31.11	2.00	93
Paraffine Cos. Inc. 4% Cum. Conv.	136.19a	151.93	4.00	
Rayonier Inc. $2 Cum.	13.58	14.65	2.00	33⅜
St. Regis Paper Co. 4.40% 1st A	76.93	84.43j	4.40	90
Scott Paper Co. $3.40 Cum.	43.95	45.37	3.40	
U. S. Gypsum Co. 7% Cum.	211.34	231.37	7.00	
United Wallpaper Inc. 4% Cum. Conv.	46.06a	11.13	2.00	
West Virginia Pulp & Paper 4½% Cum.	75.75c	75.44	4.50	108
Common Stocks				
APW Products Co.	$1.24	$1.46	$0.25	5⅜
American Writing Paper Corp.	1.61	1.07	0.25	
Armstrong Cork Co.	6.41		2.60	54¾
Celotex Corp.	6.59c	7.08f	1.50	30½
Certain-Teed Prods. Corp.	3.75	3.83	0.75	17½
Champion Paper & Fibre	4.47g	4.99h	1.50	23⅜
Congoleum Nairn Co.	4.55		2.00	34½
Container Corp. of America	10.09	8.50j	2.00e	35¼
Crown Zellerbach	6.81i		2.00	31⅜
Dixie Cup Co.	5.87		1.00	37
Dixie Cup Co. A				
Flintkote Co.	6.27	6.16	2.50	35¼
Robert Gair Co. Inc.	2.83	2.80	0.40	8⅝
Great Northern Paper Co.	4.56		2.40	14⅛
International Paper Co.	15.02	15.49	4.00	58½
Johns-Manville Corp.	3.17	3.28j	1.40	36¾
Kimberly-Clark Corp.	4.29		1.40	21¾
MacAndrews & Forbes Co.	3.68	3.70j	2.50	37¼
Marathon Corp.	3.39c	3.61f	1.00	
Mead Corp.	7.33	7.10j	2.00	19½
National Container Corp.	4.13	3.59	1.20	11⅝
Paraffine Cos. Inc.	2.14a	2.39	1.20	24
Rayonier, Inc.	7.30	7.97	1.00	35¼
Ruberoid Co.	10.88	11.46	2.75	65
St. Regis Paper Co.	2.66	2.87j	0.60e	12¼
Scott Paper Co.	3.02	3.13	2.20	47
Sutherland Paper Co.	6.87	6.61	2.50	40⅜
Taggart Corp.	1.29		0.60	
Union Bag & Paper Corp.	7.93	8.29	3.00	35
United Board & Carton	5.11b	4.92f	1.00	
U. S. Gypsum Co.	10.00	10.98	4.00	104½
United Wallpaper	1.46a	0.28		4½
West Virginia Pulp & Paper	11.40c	11.36	3.00	48½

(a) Year ended 6/30/47
(b) Year ended 5/30/47
(c) Year ended October 31, 1947
(e) Plus extras
(f) 12 Months to approximately April 30, 1948
(g) Year ended approximately April 30, 1947
(h) 12 Months to approximately January 30
(i) Year ended April 30, 1948
(j) Twelve mo. to approximately June 30, 1948

Dividends Declared

MORRIS, Ill. — Morris Paper Mills declared an extra dividend of 25 cents, payable August 10 and a regular quarterly dividend of 25 cents on the common, payable September 10.

NEW YORK—Rayonier, Inc., declared the regular quarterly dividend of 50 cents per share on the $2 dividend cumulative preferred stock, payable October 1 to holders of record September 17.

ROTHSCHILD, Wis.—Marathon Corp., has increased the quarterly dividend on its common stock to 35 cents per share, payable August 20 to stockholders of record July 31. Previous dividend rate was 25 cents. Directors also declared a dividend of $1.25 per share on the preferred, payable October 1.

NEW YORK—St. Regis Paper Co. declared a regular quarterly dividend of 15 cents per share on the common stock, plus an extra dividend of 10 cents per share, both payable September 1 to stockholders of record July 30.

ERIE, Pa.—Hammermill Paper Co., declared a common stock dividend of 37½ cents per share payable September 10 to holders of record August 20. Directors proposed an amendment to the articles of incorporation, splitting the company's common shares two-for-one, and increasing the total number of authorized shares to 600,000.

NEW YORK—Taggart Corp. declared a regular dividend of 15 cents on the common stock, payable September 1 to shareholders of record July 30.

CHESTER, Pa.—Scott Paper Co., declared a regular quarterly dividend of 55 cents on the common stock, payable September 13 to holders of record, August 31.

Crown-Zellerbach Corp.

SAN FRANCISCO—Record sales boosted net income of Crown Zellerbach Corp., in the fiscal year ended April 30 to an all-time high of $19,614,698, equal to $6.81 a common share, from $15,053,306, or $5.22 a share, in the preceding year. Net sales totaled $153,395,529, a gain of 20 percent.

The company's output of paper and pulp in the fiscal year established a new record of 735,362 tons, approximately six percent more than the previous record set in the preceding 12 months. The increase was made possible primarily by completion of plant additions and installation of new production machinery. Net additions to the company's properties in the year were valued at $23,082,000.

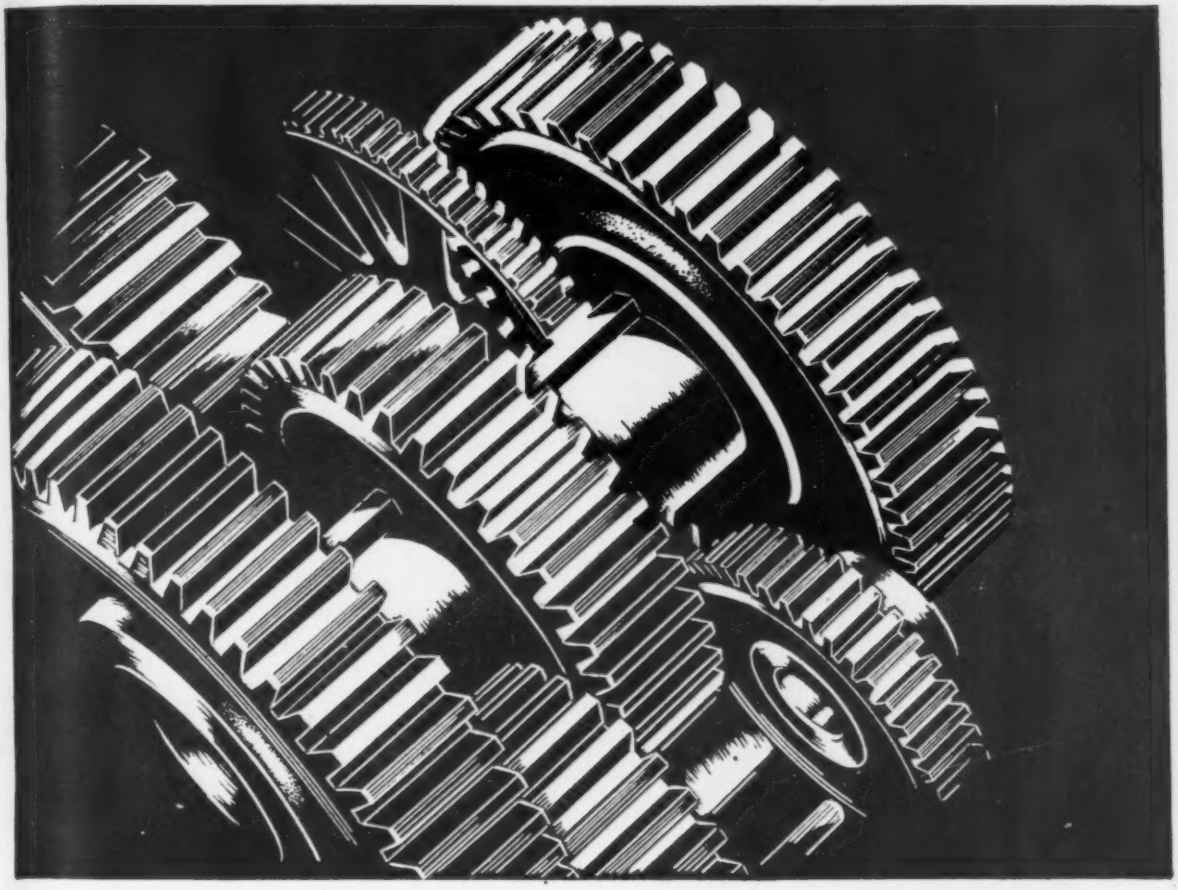
In the last three years Crown Zellerbach has invested more than 50 million dollars in plant improvements, new timberlands, logging roads, and miscellaneous equipment. Contemplated expenditures in the current fiscal year for these purposes are 15 millions.

M. & O. Paper Co.

MINNEAPOLIS — Minnesota & Ontario Paper Co. reports net sales for the first six months ending June 30, 1948, at $25,966,341 compared to $23,879,413 for the same period in 1947.

Profits after taxes and reserves for contingencies for this six months' period, subject to audit, were $3,060,375 ($2.37 per share outstanding) as compared with profits after taxes and reserves for the corresponding period in 1947 of $2,635,775 ($2.04 per share outstanding).

YES! Tycol "Engineered Lubrication" performs better . . . BETTER . . . BETTER



Tycol Engineered Lubrication performs better because:

. . . *Tycol Engineered Lubrication* supplies the scientific answer to every lubricating need in industry—from spindle oils for textile plants to roll neck greases for steel mills.

. . . *Tycol Engineered Lubrication* boosts production by promoting efficient, smoother-running machine operation . . . there's a Tycol oil or grease "engineered" for your specific job.

. . . *Tycol Engineered Lubrication* slashes costs by prolonging equipment life, protecting it against wear and tear . . . repair bills and "down time" are invariably reduced.

Let Tide Water Associated help you select the best lubricant for your particular need. Write, wire or phone today to your nearest Tide Water Associated Office for full details.

TYCOL
INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C.
Pittsburgh • Philadelphia
Chicago • Detroit • Tulsa
Cleveland • San Francisco

TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE - NEW YORK 4, N.Y.

LUBRICATION — "ENGINEERED TO FIT THE JOB"

Over-All Demand

(Continued from page 11)

and peoples of the world will become further industrialized. This means more paper, board, and products; and that means more pulp consumption.

Leaving the uncertainty of Russia out of the picture as either a factor in pulp supply or demand, there would appear to be a growing world requirement for pulp from the few principal European producing and exporting countries, yet with little evidence of even a return to prewar production levels in those countries.

It would appear that if the nonintegrated paper industry of the United States were to remain in competitive existence new supplies of reasonably and fairly priced pulp must be foreseen before long. Even then, it can be expected that some of the less efficient nonintegrated papr mills will go out of existence in the next few years.

Already, with only the early stages of competition in paper and products apparent, current Commerce Department Field Office reports point to plans to shut down certain small high-cost, submarginal mills brought into production during the war. Several other nonintegrated mills are reported cutting back from a 6 day week to 5 or 4 days, either because of high cost pulp or for slackness in business. This trend apparently has been going on for the past few months.

Reports just received from Commerce Department Field Offices further confirm their findings of preceding months that there is a growing trend in the pulp and paper field toward caution and conservative action, and a settling down to "brass tack" considerations of furthering efficiency and lessening operational costs, as well as intensified sales and marketing efforts.

With more durable goods again on the market, including such items as automobiles and new homes, consumers have returned close to the prewar relationship in the percentage distribution of their retail sales dollar, with perhaps a further margin of percentage decline still to take place in the nondurable group relative to total retail sales. Mr. Neubrech stated that this perhaps explains to a substantial degree why paper and board sales in general have tended to level off in recent months, even though the gross national product in terms of value has continued to rise.

Imports of newsprint from both Canada and the European countries, which furnish a large part of the market newsprint, have been considerably larger in volume this year than during the same period in 1947.

While newsprint imports have fluctuated from month to month, they have consistently shown a rise over the corresponding months in 1947, the total for the first 5 months of the current year surpassing that for the same period in 1947 by approximately 209,000 tons or 14 percent. Imports also continue to furnish an increasing portion of our consumption, 84 percent of our 1948 supply coming from foreign sources compared with 82 percent in the first 5 months of 1947.

"While reports from various parts of the country indicate that the newsprint market is still tight for the small publishers and printers, the more numerous 'for sale' advertisements appearing in trade papers indicate that spot or market newsprint is more readily obtainable than a few months ago.

Watson Island Mill Ready In Two Years

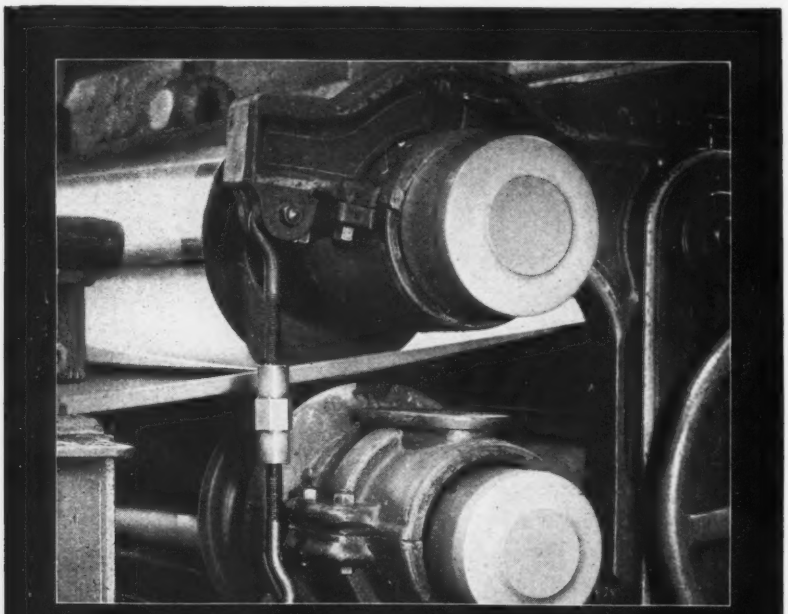
VANCOUVER, B. C. — Construction is expected to start in the immediate future on the pulp mill of the Columbia Cellulose Co. at Prince Rupert, B. C.

Contracts for clearing work on the site of the $25,000,000 cellulose mill and pulp plant have now been completed.

Officials of the company, a wholly-owned subsidiary of the Celanese Corp. of America, report the plant is expected to be in full operation in about two years.

The mill, which is being built on Watson Island, will have a capacity of 200 tons a day of purified cellulose.

Watson Island is eight miles south of Prince Rupert and was used by the U. S. Army as a supply base during the war. It has deep-water wharfage and trans-continental rail facilities.



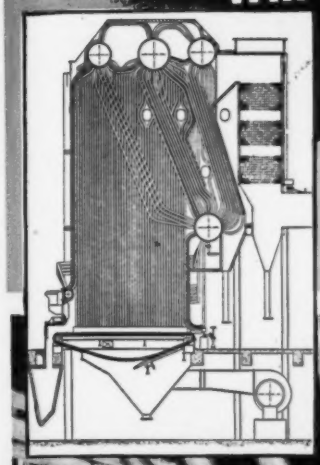
OVER 150 IMPORTANT PAPER MILLS USE CINCINNATI RUBBER COVERED ROLLS!

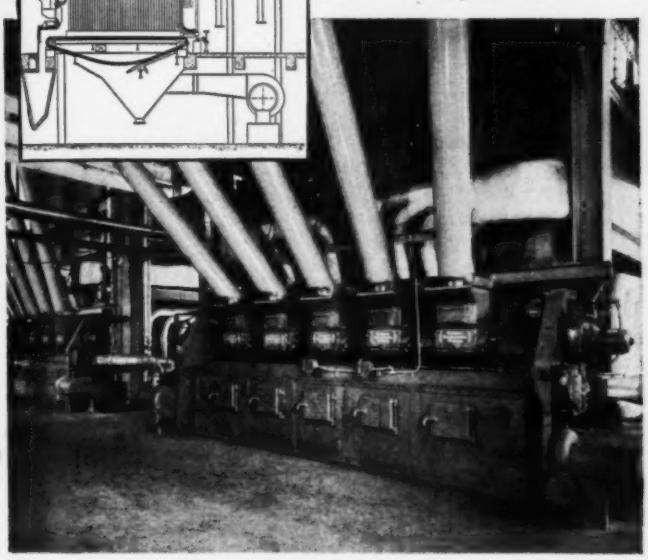
And there are **four** big reasons . . . Uniform density — Longer period between regrinding — Absolute conformity to specifications — Precision grinding . . . *four big reasons* why you can count on greater dependability and longer life from Cincinnati Rubber Covered Rolls.

Send your next Roll to Cincinnati for Re-covering!

THE CINCINNATI RUBBER MFG. CO.
CINCINNATI 12, OHIO

DETROIT ROTOGRATE STOKERS Will Cut the Cost of Producing Steam In These Paper Mills





150,000 pound units with Detroit RotoGrate Stokers— Consolidated Paper Company, South Side Plant, Monroe, Michigan.

Fuel economy and recognized ability to handle high capacities and widely fluctuating loads has made the Detroit RotoGrate Stoker popular with Paper Mills.

A spreader type with grates that move slowly *forward* to *continuously discharge the ash at the front*. Successfully burns all grades of coal and Lignites. No special fuel preparation necessary.

Backed by over ten years' experience building Detroit RotoGrate Stokers. Our Engineering Department at your service—no obligation. Write for Bulletin.

Recent Orders:

American Box Board Co.
Grand Rapids, Mich. (Two Contracts)
Appleton Coated Paper Co.
Appleton, Wisconsin
Chillicothe Paper Co.
Chillicothe, Ohio
Consolidated Paper Co.
Monroe, Michigan (Two Contracts)
Flambeau Paper Company
Park Falls, Wis.
Fletcher Paper Company
Alpena, Michigan
The Great Northern Paper Co.
Millinocket, Maine
Heberg Paper Mills, Inc.
Green Bay, Wisconsin
International Paper Co.
Panama City, Fla.
Manitoba Paper Co. Ltd.
Pine Falls, Manitoba
Michigan Carton Company
Battle Creek, Mich.
Michigan Paper Company
Plainwell, Michigan
Northwest Paper Company
Cloquet, Minnesota (Two Contracts)
Rex Paper Company
Kalamazoo, Michigan
River Raisin Paper Co.
Monroe, Michigan
Schmidt & Ault Paper Co.
York, Pennsylvania
Sutherland Paper Company
Kalamazoo, Michigan
Thilmany Pulp & Paper Co.
Kaukauna, Wisconsin
West Virginia Pulp & Paper Co.
(Two Contracts)
Charleston, S. C. and Covington, Va.

DETROIT STOKER COMPANY

GENERAL MOTORS BUILDING, DETROIT 2, MICHIGAN

WORKS AT MONROE, MICHIGAN · DISTRICT OFFICES IN PRINCIPAL CITIES

OBITUARY

Walter Arkwell

Walter Arkwell, 66, in charge of purchases with the Hill division of U. S. Envelope Co., and an employe of the firm for 43 years, died July 20. Mr. Arkwell started with the envelope company in 1904 at the Worcester, Mass., plant. In 1925 he was transferred to the Philadelphia division as superintendent. He returned to Worcester in 1940 to take charge of purchases at the Hill division. Surviving are his widow and two daughters.

Willard J. Barnes

Willard J. Barnes, 81, chief electrical and steam engineer of the West Virginia Pulp & Paper Co. plant at Mechanicville, N. Y., died at his home on July 21, following a brief illness. Mr. Barnes served his firm for approximately 50 years. Surviving him are his widow, two daughters and a brother.

W. E. Hardie

W. E. Hardie, 58, president of the Imperial Box Division of the Morris Paper Mills, Chicago, died on July 20. Although he had been ill for a number of years with a heart ailment, his death was unexpected.

For many years Mr. Hardie was a director of the Folding Paper Box Ass'n., of America, and in 1946 was a member of its executive committee. During the war he was chief of the Folding Box Section of the WPB.

Harry E. Livingstone

Harry E. Livingstone, an associate of the late Robert Currie, founder of the Dominion Paper Co., Montreal, and an organizer of the H. E. Livingstone Paper Co., in 1909 in Ontario, died in Toronto on July 19.

Dr. J. K. Moore

Dr. J. K. Moore, supervisor in the cellulose products division of the Hercules Powder Co. experiment station, Wilmington, Del., died of polio on July 13. Dr. Moore was a member of the American Chemical Society, Alpha Chi Sigma and Sigma Xi. Surviving him are his widow, two daughters, a son and his parents.

John Schaefer

John Schaefer, 74, formerly identified with his family's 69-year-old wallpaper business in Washington, D. C., died at his home in that city on July 18. Surviving Mr. Schaefer is a sister.

Babcock Nekoosa-Edwards Director Emeritus

PORT EDWARDS, Wis.—Nekoosa-Edwards Paper Co. stockholders on July 21 elected the following active directors for the coming year: John E. Alexander, C. A. Jasperson and S. A. Casey, all of Port Edwards; Walter A. Radke, Nekoosa; L. M. Hanks, Madison; Albert S. Puelicher, Milwaukee; and Judson G. Rosebush, Appleton. At his own request, Guy O. Babcock, a member of the directorate since 1927 and vice-president of Nekoosa-Edwards since 1940, was not returned to the board. The stockholders voted unanimously to elect Mr. Babcock as "director emeritus" in appreciation of his many years of service.

Following the stockholders meeting, the directors reelected the corporate officers. They are John E. Alexander, president and general manager; C. A. Jasperson, secretary-treasurer; Harry Deyo, assistant secretary-treasurer.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1948		Corresponding Weeks—1947	
June 12	95.0	June 14	107.2
June 19	95.0	June 21	106.1
June 26	99.8	June 28	103.7
July 3	91.3	July 5	62.7
July 10	62.3	July 12	93.5
July 17	*88.6*	July 19	102.8

COMPARATIVE MONTHLY SUMMARIES

1947						1948	
Jan.	102.1	May	106.2	Oct.	109.5		
Feb.	105.9	June	106.0	Nov.	109.3	Jan.	100.9
Mar.	106.1	July	93.5	Dec.	101.5	Feb.	100.3
Apr.	105.1	Aug.	104.2			Mar.	100.6
		Sept.	102.0	Year Avg.	104.3	Apr.	102.5
						May	100.4
						June	*94.5*

COMPARATIVE YEARLY SUMMARIES

	1941	1942	1943	1944	1945	1946	1947	1948
Year to Date	93.4	95.7	87.7	87.3	87.5	99.2	103.5	97.8
Year Average	97.4	90.4	87.8	88.1	89.4	101.1	104.3	

NOTE: As of January 10 capacity base increased by 13.3%.

PAPERBOARD OPERATING RATIOS†

Current Weeks—1948		Corresponding Weeks—1947	
June 12	101	June 14	103
June 19	97	June 21	102
June 26	97	June 28	102
July 3	89	July 5	78
July 10	56	July 12	76
July 17	*84*	July 19	97

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1947	99	103	101	100	101	101	90	99	96	101	99	89	98
1948	99	100	102	102	100	*94*							

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

MEISEL MACHINERY IS HELPING IN ALL FIELDS

Cigarette Wax Photographic Jet Propulsion

Condenser Grease Proof Snap-out Forms Aero-engine Parts

MEISEL PRESS MFG. CO. 950 Dorchester Ave., Boston

Empire-Allied Meeting Set

AUBURN, N. Y.—President Butler Cox of the Empire State Paper Ass'n., and President Mel S. Kelley of the Allied Paper Salesmen's Ass'n., have appointed chairmen for the joint meeting to be held at Whiteface Inn, Lake Placid, N. Y., September 16-19. They are: For Empire Ass'n., H. George Buck, 220 South Geddes Street, Syracuse, N. Y.; for Allied Ass'n., J. Walter Fontaine, room 201, 169 Erie boulevard, West, Syracuse.

The tentative program follows:

Program

September 16—Arrival time for majority.

September 17—Golf and Sports morning and afternoon; 8 A.M.—Breakfast in the main dining room; 12 Noon—Luncheon in the main dining room; 5 P.M.—Cocktail Party tendered by Allied Paper Salesmen to all in attendance. In the grill; 7 P.M.—Dinner in the main dining room; 9 P.M.—Merchants Meeting held on the upper floor of the boathouse; and 9 P.M.—Allied Salesmen's meeting held in the sun room off the lobby.

September 18—Golf and Sports morning and afternoon; 8 A.M.—Breakfast in the main dining room; 12 Noon—Luncheon in the main dining room; 5 P.M.—Cocktail Party tendered by Empire State Paper Ass'n.; to all in attendance. In the grill; and 7 P.M.—Dinner in the main dining room followed by the awarding of the prizes.

September 19—Departure any time you are ready. The Inn will remain open if you care to extend your visit or have friends or relatives join you. Make your own arrangements. The time is given in Eastern Daylight time.

Officers

Empire Officers: President Butler Cox, Fine Papers, Inc.; Vice Pres. Max R. Chudy, Chudy Paper Co., Inc.; Vice Pres. Sidney T. Jones, Jr., Hudson Valley Paper Co.; and Secy. & Treas. Wm. B. Dunning, Sr., Logan Paper Co.

Allied Officers: President Mel S. Kelley, Southern Kraft Div. International Paper Co.; Vice Pres. Wm. C. Kennedy, Southern Advance Bag & Paper Co.; and Secretary & Treasurer George Austin, Lily Tulip Cup Corp.

Committees

Whiteface Committee: Empire Ass'n.—Chairman H. George Buck, the Alling & Cory Co. Co-chairmen J. R. McAuliffe, McAuliffe Paper Co., and H. D. Cohen, Kolko Paper Co.

Whiteface Committee: Allied Ass'n.—Chairman —J. W. Fountaine, manufacturers' representative. Co-chairmen Wm. I. Booth, Royal Lace Paper Co.; Wm. S. Clark, Sealright Co.; Wm. A. Eichele, Minn. Mining & Mfg. Co.; and E. C. Herzer, Dobeckmun Co.

Reception Committee: Chairman C. Howard Maurinus, the Alling & Cory Co.; Jay K. Smith, J. & F. B. Garrett Co.; Ray Unger, Cramer Force Co.; T. W. Utterback, Holland Paper Co.; Walter Cohen, Peerless Paper Products Co.; D. A. Price, Chas. P. Mugler Co.; George W. Beale, Sherman Paper Products Co.; Clyde S. Hunter, McLaurin-Jones Co.; William A. Koch, Brown Co.; and Harry J. Green, Frank M. Sayford Co.

Sports Committee: Chairman—Sidney T. Jones, Jr.; Monroe Bingeman, the Alling & Cory Co.; Wm. B. Dunning, Jr.; W. N. Van Alstine, Jr., Hudson Falls Paper Co.; Max R. Chudy, Jr.; John A. Cashman, Lily Tulip Cup Corp.; Walter L. Frey, National Waterproof Papers, Inc.; R. T. Montague, Port Huron Sulphite & Paper Co.; Andrew Sorenson, F. N. Burt Co.; and Samuel W. Kolko, Jr., Kolko Paper Co.

Golf Committee: Chairman—George W. Adams, Fine Papers, Inc.; Wes. B. Swan, Sanitary Products & Paper Co.; Leo R. Mead, C. P. Mead & Sons, Inc.; M. Wilkinson, Hubbs & Hastings; George Wilcox, Wilcox Paper Co.; Ed Willson, Franklin Cowan Paper Co.; Sherman J. Farley, Minn. Mining & Mfg. Co.; Frank B. Rice, Dixie Cup Co.; Edw. V. Deans, Jr., Racquette River Paper Co.; and L. H. Spann, Lily Tulip Cup Corp.

Photographers: George Wilcox, Wilcox Paper Co.; and Wm. A. Eichele, Minn. Mining & Mfg. Co.

Prizes: Chairman—Chas. P. Mead, C. P. Mead & Sons, Inc.; Andrew McLane, Logan Paper Co.; and J. Walter Fountaine.

Publicity: John V. McCarthy, J. & F. B. Garrett Co.

Weinstock Erecting Warehouse

WASHINGTON—A contract to build a warehouse for the Weinstock Paper Co. at 20 L Street, S.W., has been signed.

Save Money...

CONVERT YOUR STARCH with RHOZYME

Rohm & Haas RHOZYMES—enzymes for the paper maker—have a long record of uniform, low-cost starch conversion for paper sizing, coating, and adhesives. Further economies are now possible with

NEW, LOWER PRICED RHOZYME E-5

This new five-times concentrate simplifies high solids, large batch conversions and is particularly adapted to preparing starches for machine coating. Is shipped in stable, dry form—easy to handle and store. Best of all, its cost is considerably lower than other starch-converting enzymes.

RHOZYME BB FOR LOW SOLIDS CONVERSIONS

RHOZYME BB, a single strength product, continues to be the standard enzyme for low solids conversions, such as tub size where enzyme concentrates are sometimes difficult to handle. Also in dry, stable form for unexcelled storage characteristics and lasting, uniform effectiveness.

AVAILABLE NOW

Both RHOZYME E-5 and RHOZYME BB are immediately available in quantities from drums to carloads. We'll gladly send you full information, plus samples for testing.

RHOZYME *is a trade-mark, Reg. U. S. Pat. Off.*

Represented in South America by Cia. Rohm y Haas, S. R. L., Carlos Pellegrini 331, Buenos Aires, Argentina and agents in principal South American cities.

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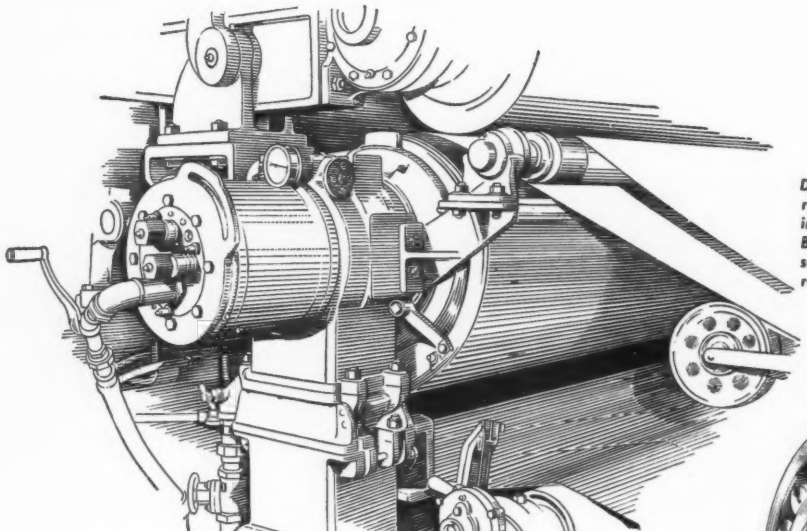
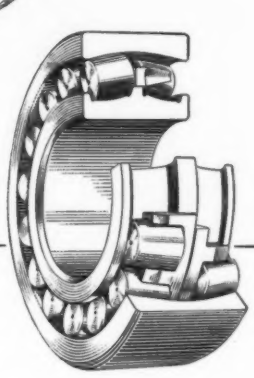
Manufacturers of Chemicals including Plastics • Synthetic Insecticides • Fungicides • Enzymes • Detergents • Germicides • Chemicals for the Leather, Textile, Ceramic, Rubber, Paper, Petroleum and other Industries

BELOIT-built Equipment Assures Reliable Operation with TORRINGTON Spherical Roller Bearings



Dependable performance of Torrington Spherical Roller Bearings in suction press roll built by Beloit Iron Works is assured by self-aligning feature and high radial and thrust capacity.



...long service life with a minimum of service attention—another advantage of these precision bearings.

A MASTERPIECE OF DESIGN in every detail, the Beloit suction press roll demands good bearing design and performance. For day to day dependable operation, the low friction coefficient and precision tolerances of Torrington Self-Aligning Spherical Roller Bearings assure smooth starting and running. High radial capacity and two-directional thrust capacity also provide long service life with minimum maintenance.

These are only a few of the many benefits which result from the use of Torrington Spherical Roller Bearings in exacting applications to your calender rolls, screens, paper dryers, chippers, beaters and Jordan engines.

You also benefit from the years of experience of Torrington's engineers in the design, construction and application of all major types of anti-friction bearings. For specialized assistance on any bearing requirement, call or write the nearest Torrington office.

THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.
District Offices and Distributors in Principal Cities

TORRINGTON *SPHERICAL ROLLER* **BEARINGS**

SPHERICAL ROLLER · TAPERED ROLLER · STRAIGHT ROLLER · NEEDLE · BALL · NEEDLE ROLLERS

Prevention of Turbine Blade Deposits

By C. E. Imhoff, Director of Laboratories and Research, Water Conditioning Department, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Interest in the various phases of feedwater treatment seems to come and go in cycles. Such topics as boiler corrosion, boiler scale prevention, caustic embrittlement and carryover have all received their share of attention as these in turn were considered major problems. In recent years the study of turbine-blade deposits has been given more consideration as these deposits represent a difficulty which has persisted in spite of advances in the art of water conditioning. The solution to this problem is considered so important that the major power companies, boiler manufacturers and steam-turbine manufacturers have pooled their resources and established a $100,000 joint research project to study this problem. As an example of how seriously blade deposits may reduce turbine capacities, *Figure 1* shows a 27 percent reduction in capacity of a turbine operating at 650 psi over a period of 26 days after which it was water washed. These deposits happened to be completely water soluble so that the full capacity of the turbine was restored after washing. More commonly, however, the deposits are not completely water soluble and capacities are not restored as in this plant just illustrated.

Methods of Study

The Allis-Chalmers Mfg. Co. has been studying, for many years, the characteristics of blade deposits and the conditions under which they are formed. A report recently has been released on a special project covering such a study in which many power companies and industrial plants participated.

Samples were carefully collected from individual turbine stages in order to study the effect of temperature upon the various characteristics. Other pertinent data such as boiler pressure, turbine throttle pressure, turbine throttle temperature, stage temperatures, boiler water analysis, steam analysis, and boiler ratings were recorded for correlation.

In many cases, the amount of deposit obtained from individual stages was too small to make a chemical analysis, so a different method had to be employed in order to determine the chemical composition. Chemical analysis has the limitation of not revealing compounds but only elements. Although a quantitative chemical analysis is useful, it is far more important to know what compounds are present and for this information all deposits were submitted to X-ray diffraction analysis.

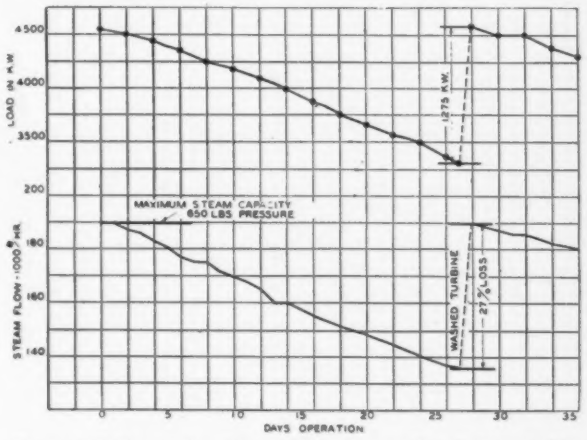


Figure 1. Table showing the reduction in capacity of steam turbine due to blade deposits.

X-Ray Diffraction Analysis

X-ray diffraction analysis identifies the compounds which are present in a powdered mixture and has the advantage of requiring only a small amount of sample. *Figure 2* shows a diffractionist filling a sample wedge prior to mounting in an X-ray diffraction camera. The size of this wedge readily illustrates what small amounts of samples are required. The X-ray diffraction method uses photographic film in recording its picture but this recorded picture is not an ordinary photograph such as is obtained in light photography. When X-rays are passed through a crystalline material, they are diffracted as shown in *Figure 3* at definite angles which are recorded on a photographic film inside the camera. The developed pattern consists of a series of lines and is illustrated in Figure 4. This method is frequently called the "finger print" method because the patterns for individual compounds are similar to finger prints, in that they are always the same for the same compounds and

A paper delivered at the Wisconsin Power Conference and Exposition, Northland Hotel, Green Bay, Wis., June 24, 1948.

INDUSTRIAL DEVELOPMENT

Paper Trade Journal, in this new section, proposes to make space availavle for discussion of administration and operational problems of the pulp and paper industry, as well as for the presentation of independent studies and research on technical and engineering subjects. Noteworthy features of paper mills, converting plants, associated industries and institutions also will be presented, as they become available. These papers will be open to all who are qualified to discuss subjects within these limits. Manuscripts, submitted for approval, will be welcomed.—E. P. McGINN, Industrial Editor.

Figure 2. Sample of deposit material being prepared for X-ray diffraction study.

patterns are compared with each other in a manner similar to the matching of finger prints.

If one wishes to determine whether calcium carbonate is present in a blade deposit, the procedure is to make an X-ray diffraction "finger print" (or pattern) of calcium carbonate and compare this to the pattern which is produced when a picture is taken of the unknown material. A direct comparison, then, between the known and the unknown indicates whether calcium carbonate is present in the unknown sample. In *Figure 4*, the pattern at the top is that of calcium carbonate. The pattern below it is that of an unknown sample. "Finger print" comparison clearly shows that calcium carbonate is a constituent of the unknown mixture.

Characteristics of Deposits

Early in the study it became apparent that turbine-blade deposits in general would fall into two classifications according to composition. Class 1 contains the compounds of calcium, magnesium, and iron, whereas Class 2 contains the sodium compounds, the silicates and forms of silica. The deposits of the first class were rather typically boiler sludges and corrosion deposits and were found mainly in low pressure turbines. Deposits of the second class were found in turbines of higher pressures and carrying an appreciable amount of superheat. The division line between high pressure and low pressure classifications is placed around 350 psi.

Table 1 shows the typical chemical analysis of turbine-blade deposits taken from various turbines. The first three analyses from turbines operating at 150 psi are unmistakably calcium and magnesium boiler sludges with iron oxide and oil. Although these same constituents may be found without any oil present, oil is such a frequent constituent that these three analyses are considered to be typical. The sample from the 250 psi turbine is mainly iron oxide, whose source was from corrosion products outside the turbine but carried into the blading through the steam. The analyses of the high pressure deposits have the common characteristics that calcium and magnesium are absent and the salts are mainly sodium salts relatively high in silica.

TABLE 1

CHEMICAL ANALYSIS OF TYPICAL TURBINE BLADE DEPOSITS

(percent composition)

	Throttle pressure psi							
Constituent	150	150	150	250	400	600	900	1200
Silica	8.1	2.1	3.2	.8	20.4	81.3	57.0	95.4
Iron oxide	22.5	2.0	9.4	81.3	1.5	3.0	0.4	0.2
Calcium oxide	5.1	20.6	29.2	.2				
Magnesium oxide	12.3	27.4	15.4	.2				
Sodium oxide					11.3	2.1	28.1	
Carbon dioxide	.7	16.2	10.0					
Sulfur trioxide	0.2	0.3	0.1	0.1			4.0	
Phosphorous pentoxide	.5	.3	13.8					
Sodium chloride					64.0	4.0	5.0	
Oil	26.6	24.9	18.5					
Ignition Loss	50.6	47.0	28.5	17.7	3.0	7.2	4.4	3.9

Table 2 shows the general relation between the occurrence of the major constituents of turbine-blade deposits determined by X-ray diffraction and throttle pressures. Calcium carbonate, magnesium hydroxide, and oil are pretty well limited to turbines taking steam from boilers operating between 100 and 300 psi. Sodium chloride occurs mainly between 300 and 600 psi turbines with a somewhat narrower range for sodium metasilicate. Sodium sulfate and sodium di-sulfate carbonate have been found in turbines operating between 300 and 900 psi. Quartz, amorphous silica, and sodium disilicate are somewhat universal in that they touch the low pressure turbine field and extend into those of the highest pressures. Sodium iron silicate is found only in the highest pressure turbines.

TABLE 2

RELATION BETWEEN OCCURRENCE OF MAJOR CONSTITUENTS OF TURBINE BLADE DEPOSITS AND THROTTLE PRESSURES

Constituent	Boiler Pressure psi	Water Solubility
Calcium Carbonate	100— 300	—
Magnesium Hydroxide	100— 300	—
Oil	100— 400	—
Calcium Phosphate	100— 400	—
Sodium Chloride	300— 600	+
Sodium sulfate	300— 900	+
Sodium Disulfate Carbonate	360— 900	+
Quartz Silica	350—1325	—
Amorphous Silica	350—1325	—
Sodium Metasilicate	400— 500	+
Sodium Disilicate	400—1200	+
Sodium Iron Silicate	1200—1250	—

In general turbine-blade deposits can be divided into two classes depending upon their composition and also their manner of formation. The components may be carried into the turbine in the solid state and cling to the blade surface by adhesion or they may be carried into the turbine in solution and cling to the blade surface as a result of crystallization. For the purpose of this paper, the former will be referred to as deposits of "sludge origin" and the latter as deposits of "boilerwater origin."

Deposits of Sludge Origin

The principal components in this class consist of calcium carbonate, magnesium hydroxide, calcium phosphate and oil. Ordinarily one does not expect to find

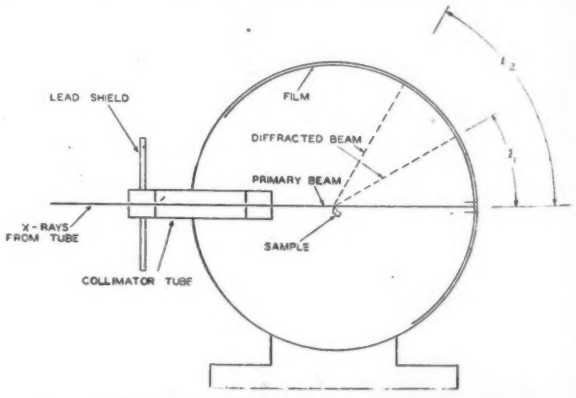


Figure 3. Showing arrangements of X-ray diffraction apparatus.

boiler sludge in steam but its presence in blade deposits shows that such is the case. The question quite naturally arises whether the sludge components were carried over by themselves or came over with slugs containing soluble boilerwater salts. Experience in steam studies has shown that sludge can be carried over into the steam in both ways. Various samples of steam have been shown to be quite low in soluble solids by the conductivity method of measurement and yet they may be turbid from the amounts of suspended sludge which they contain. This appears to be true particularly if there is oil present in the feedwater.

When this condition arises, the sludge contained in the steam is usually higher in magnesium than that contained in the boiler blowoff. This is quite to be expected, since magnesium hydroxide is of lower specific gravity than calcium carbonate. It is also somewhat more adsorbent toward oil. The oil adsorbed on the sludge causes it to rise to the surface in the steaming drum and the gaseous steam passing through this surface mechanically carries small particles up into the vapor space and into the steam header. Such a mixture has a certain amount of plasticity and when these semi-plastic particles impinge on the surface of the turbine blade, the tendency is to adhere to that part of the blade with which it comes in contact. These types of deposits tend to build up first in the region of the shrouding and then fill up the space between the individual blades.

Deposits of Boiler Water Origin

The low pressure blade deposits appear to be due to an accumulation of solids which have come into the turbine already in the solid state. The formation of high pressure blade deposits is different and is due to a crystallization on the blade of material which is in solution in the steam either directly in the gaseous phase or in the fog-like water droplets which have passed through the superheater. One may draw some analogy between this type of deposition and the scaling of boilers, since boiler scale results from the crystallization of soluble material on the evaporating surface. There is one notable difference, the materials which deposit on boiler tubes are those which become more insoluble as the temperature is increased, while the materials of this class which deposit on turbine blades are those which become more insoluble as the temperature is decreased.

Prevention of Blade Deposits

Since the essential nature of low pressure blade deposits is sludgelike and that of high pressure blade deposits

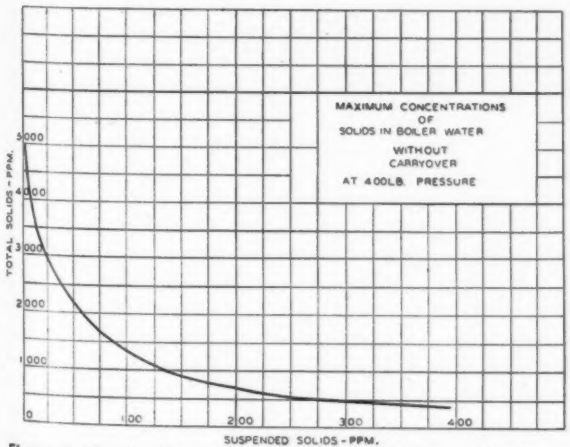


Figure 4. Showing X-ray diffraction pattern of known and unknown samples.

Figure 5. Maximum concentration of solids in boiler water without carryover at 4,000 lbs pressure.

is boiler-water-like, it is apparent that the preventon of the former lies in sludge removal conditioning and control, and the preventon of the latter lies in the control of boiler water solids.

There are still a good many low pressure plants which operate with internal treatment so that all of the sludge constituents are precipitated within the boiler. Suspended solids concentrations are thus often quite high. The principal element of control, then, is sludge deconcentration either inside or outside of the boiler.

Concentration Control

There are two general methods of controlling concentrations of both precipitated solids and soluble solids. Deconcentration may be accomplished by control of boiler blowdown or the concentrations can be controlled by removal of solids before using the water for boiler-feed purposes. The removal of suspended sludge solids is not always efficiently done by blowdown, particularly if the blowoff is not located in that part of the boiler where the sludge concentrations are greatest. One of the objectives of internal water conditioning is to produce a sludge which is fluid in all respects and will deconcentrate in the same or greater proportion as the soluble boiler water salts.

Operating Limits

The engineer by experience arrives at certain concentration limits for his boilers below which clean steam will be produced. There are many different factors which make the limiting values high or low. One of the chief factors, however, is boiler pressure and approximate limits for boiler concentrations have been set up on this basis. *Table 3* gives the approximate limiting concentrations for boiler pressures up to 1500 psi. Total dissolved solids includes all the sodium salts which contribute to the sodium salt blade deposits, suspended solids which contribute to the sludge type deposit, silica which controls the silicate and pure silica deposits and oil which contributes to the sludge like deposits. It will be seen that suspended solids concentrations consisting of sludge constituents are much more critical than the dissolved solids. These should be no greater than five percent of the dissolved solids. The relative effect of dissolved and

TABLE 3

LIMITING CONCENTRATIONS IN BOILER WATER FOR THE PREVENTION OF ENTRAINMENT IN STEAM (PARTS PER MILLION)

Boiler Pressure	Dissolved Solids	Suspended Solids	Total Alkalinity	Silica	Oil
300	3500	175	700	100	7
450	3000	150	600	80	7
600	2500	125	500	55	7
750	2000	100	400	40	7
900	1500	75	300	27	7
1000	1250	63	250	20	7
1500	1000	50	200	4	7

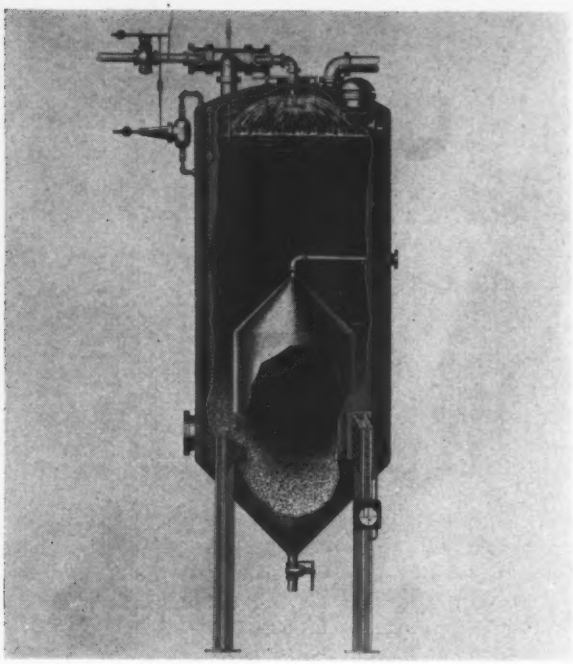


Figure 6. Hot lime-soda water softener.

suspended solids on entrainment can be shown as in *Figure 5* from tests made on a boiler operating at 400 psi An increase in suspended solids very greatly reduced the amount of soluble solids which could be carried in the boiler without contamination of the steam.

Solids Removal By Primary Treatment

When water conditioning equipment is being considered for a new plant, that consideration which affects the turbine should be in regard to what reduction will be made in the hardness or sludge forming suspended solids, the sodium salt, and the silica. Using Lake Michigan water and a well water as example, *Table 4* illustrates how these three impurities are reduced through various types of primary softening equipment. A hot lime soda softener such as illustrated in *Figure 6* will usually reduce the hardness to between 15 and 20 parts per million regardless of the hardness of the original water and will also make some reduction in the silica content.

The alkalinity, however, will always be between 45 and 50 parts per million and the sodium salts corresponding to this alkalinity will be present in addition to those exsting naturally in the water. A sodium zeolite softener will remove the sludge forming hardness to zero but in doing so will increase the sodium salts. It also has no affect on the dissolved silica. Often sodium zeolite treatment cannot be used because of the extremely high sodium salt concentration which is produced.

The sodium-hydrogen zeolite combination has a distinct advantage over the sodium zeolite only since in addition to producing zero hardness a considerable reduction is made in the sodium salts concentration. No reduction in silica is accomplished through this combination of softeners and there is the disadvantage in producing a high SiO_2 to Total Dissolved Solids ratio. This may give rise to blade deposits consisting of silica only.

The deionizer which consists of a hydrogen zeolite and an anion exchanger removes hardness and sodium salts to a very low value, even lower than the sodium hydrogen combination but still does not affect the silica. Except for the silica, the amount of solids is comparable to that in commercial distilled water. For high pressure operation, however, even this may not be suitable because of the silica concentration.

TABLE 4

EFFECT OF EXTERNAL TREATMENT ON TURBINE BLADE DEPOSIT SALTS (ppm $CaCO_3$)

	Lake Michigan			A Well Water		
Type of Treatment	Hard-ness	Sodium Salts	Silica	Hard-ness	Sodium Salts	Silica
Untreated	130	6	3	530	0	28
Hot Lime-Soda	15	50	1	15	40	2
Sodium Zeolite	0	130	3	0	530	28
Sodium-Hydrogen Zeolite	0	15	3	0	15	28
Deionizer	0	5	3	0	7	28
Deionizer plus Silica Adsorption	0	5	0.3	0	7	.8

Recent developments in exchange softening, however, now make it possible to remove silica through a special resin after the water has passed through a deionizer. This process produces water comparable to pure condensate in quality. The cost of deionization is still somewhat high but the number of commercial installations is continually increasing.

Oil

The best place to remove oil is in the feedwater before it is fed to the boiler. Oil contamination is usually the result of emulsified lubricating oil which comes back in condensate from steam engine exhaust. In order to lubricate properly, the oil must necessarily be highly dispersed in the steam passing through the engine and the more highly dispersed, the more difficult it becomes to separate from the condensed condensate. Steam traps and oil separators are helpful but mechanical separation of emulsified oil from water is a process difficult to perform. The oil tolerance limit of a feedwater is rather difficult to determine, since there are many different kinds of lubricating oils and the amount to be tolerated within a boiler depends to a great extent upon the amount which is absorbed by precipitated sludge. If the ratio of precipitated sludge to oil is high, the greater specific gravity of the sludge will allow it to carry the adsorbed oil below the surface of the steaming level in the steam drum and effect a certain amount of removal in this manner through sludge blowdown. This works to the advantage of many low pressure plants which otherwise might experience considerable difficulty from oil. In these instances there is always the problem of possible oil contribution to scale formation. Oil being a very good heat insulator will increase the potential difficulties from scale formation. Where oil-free condensate is absolutely necessary, the suspension must be coagulated by either alum or iron salts and alkali and then passed through a filter such as illustrated in *Figure 7*. The coagulant acts to break up the emulsion and to adsorb the oil particles. The condensate containing the coagulant and adsorbed oil is admitted at the top of the filter which contains properly sized layers of sand or coal. Since the coagulant has considerable body and volume, the finely divided filtering medium acts as a strainer allowing the clarified water to pass through and holds back the coagulant containing the occluded oil. Oil may be removed so that only a fractional part per million remains by this procedure.

Relief from oil which gets into the boiler has been obtained in some instances by installing skimmers; that is, continuous blowdown outlets close to the surface of the water in the boiler drum. The oil and oil-bearing particles rising to the top will concentrate in that portion of

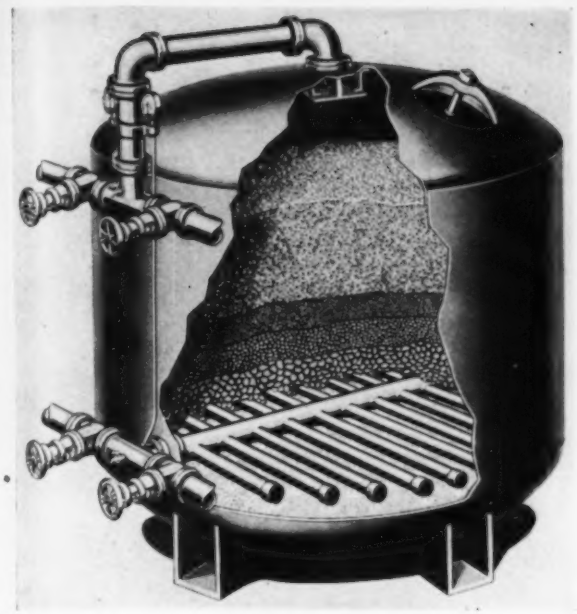


Figure 7. Pressure type sand water filter.

the boiler and with the blowdown properly located, a greater than normal deconcentration of oil will be affected. Adsorbents such as activated carbon have also been used internally but in conjunction with coagulants in order to prevent the carbon oil mixture from passing into the steam.

Added Chemicals

Another method of preventing or reducing the severity of turbine blade deposits is by the addition of certain soluble salts to the boiler water. The success of such a procedure cannot be predicted in advance for in practically all cases, the total contamination in the steam is increased by such treatment. Where it is successful, it in some way interferes with the crystallization of turbine blade salts and thereby retards the total amount of deposition. This method is effective only upon those deposits of boilerwater origin. The most common of the salts added for this purpose are sodium chloride and sodium sulfite.

Insoluble compounds such as magnesium oxide and hydrated iron oxide have been used successfully by adding them directly to boilers to alleviate silica blade deposit problems. These compounds serve to reduce the silica concentration in the boiler water by adsorption. In the adsorbed form the silica becomes a part of the sludge and will not volatilize in the steam.

SUMMARY

The successful prevention of turbine blade deposits consists in:

1. The recognition of the compounds comprising blade deposits.

2. A knowledge of the approximate limits of boilerwater concentrations for these compounds.

3. Control of these limits by primary or supplementary water treatment and

4. The use of soluble salts having specific inhibitory action.

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Paper Product Pointers
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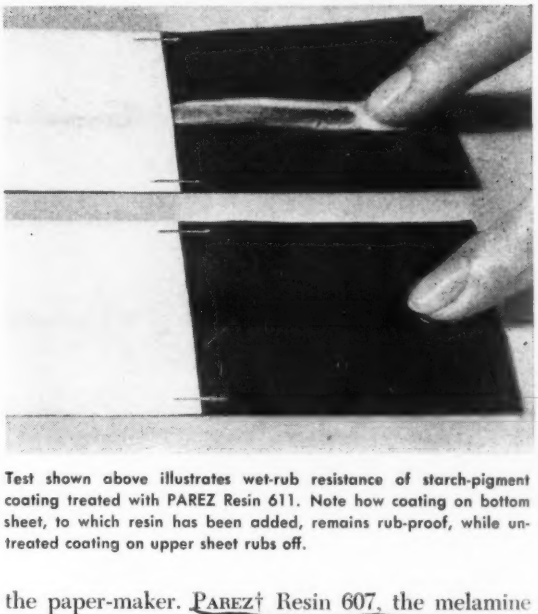

Test shown above illustrates wet-rub resistance of starch-pigment coating treated with PAREZ Resin 611. Note how coating on bottom sheet, to which resin has been added, remains rub-proof, while untreated coating on upper sheet rubs off.

For full information on PAREZ Resin 611, send for Technical Bulletin No. 19.

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The Chemistry of Urea and Melamine Resins*

By Robert W. Auten[1]

Abstract

The chemistry of the industrially important, thermosetting urea-formaldehyde and melamine-formaldehyde resins involves three successive reaction stages: (A) formation of crystalline methylol derivatives; (B) condensation to soluble or dispersible resins composed of linear, branched, or cyclic molecules; and (C) cross-linking to hard, insoluble, infusible products characterized by two-and three-dimensional molecular networks.

Under neutral condition urea reacts with 1 or 2 moles of formaldehyde to form monomethylol urea or dimethylol urea, respectively. Prominent among the several mechanisms which have been proposed for the "B" stage resinification are: intermolecular condensation to form linear or branched polymeric molecules (Walter); intramolecular loss of water followed by polymerization along C-N double bonds; and the Marvel-Thurston theory of cyclic trimer formation, according to which urea is assumed to behave as an amino-acid amide.

Unmodified "B" stage urea-formaldehyde resins have been extensively used in molding powders, as plywood adhesives, and for waterproofing starch. Certain chemical modifications have extended the range of usefulness. Co-reaction with sodium bisulphite has been used to introduce methylene-sulphonate groups which enable highly condensed hydrophils to be prepared which are eminently suitable for use as beater additives in the production of wet-strength paper. Another example of chemical modification is co-reaction with an alcohol to produce alkoxy-substituted urea-formaldehyde resins which are soluble in organic solvents and useful as surface coatings.

Melamine is a thermostable, chemically resistant, hexa-functional heterocyclic compound which can be prepared from calcium cyanamide through dicyandiamide as intermediate. "A" stage compounds are known with as many as six methylol groups per molecule. The "B" stage products are roughly analogous to those from urea and have been widely used for similar purposes. Of special interest has been the production of wet-strength paper by the Wohnsiedler process, which involves adding directly to the pulp a cationic, hydrophil colloid prepared by aging a low-condensed melamine-formaldehyde condensate in dilute solution and in the presence of nearly equivalent proportions of strong acid. The principle of introducing alkoxy groups by alcoholic co-reaction has been extended to the melamine-formaldehyde polycondensation in the preparation of high quality coating resins.

Thermosetting nitrogenous resins have won positions of considerable importance in a variety of industrial applications—in coatings and enamels, the bonding of plywood, the manufacture of molded and laminated articles, improvement in the physical properties of paper, and the stabilization of textiles against shrinkage and crushing. So far, the two most important examples of these versatile thermosetting resins have been the urea-formaldehyde and melamine-formaldehyde types. The urea resins have been produced in this country in considerable volume since the early 1930's, whereas the more recent melamine resins date back to approximately 1939. These resins as a class are characterized by their ability to form hard, brittle, colorless, chemically resistant products upon conversion under the influence either of heat or of suitable catalysts or more generally of a combination of both. They are classed as relatively rapid-curing and are sensitive to small changes in temperature and catalyst concentration.

A consideration of the chemistry of these resins involves three reaction stages, which may be classified broadly as follows:

"A" Stage: Methylol derivatives, analogous to monomers.

"B" Stage: Intermediate stage in polycondensation. Resins soluble or dispersible in water or other solvents. Molecules doubtless of essentially linear type, probably branched.

"C" Stage: Final "cured" stage, following conversion by heat. Insoluble, infusible, hard products. Molecules considered as complex, two-and three-dimensional networks.

Urea-Formaldehyde Resins

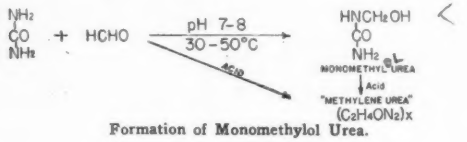
The simplest known reactions of urea and formaldehyde are those which lead to the formation of the methylol ureas. Monomethylol urea and dimethylol urea are the "A" stage intermediates referred to above. Under neutral or slightly alkaline conditions and at mild temperatures, equimolecular proportions of urea and formaldehyde react to form monomethylol urea *(1)*:

This product is a water-soluble, crystalline solid (m.p. 111°C.). Under similar reaction conditions urea

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 23-26, 1948.

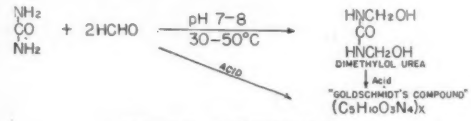
[1] Resinous Products & Chemical Co., Philadelphia, Pa.

can react with two moles of formaldehyde to form dimethylol urea *(1)*, which is also a water-soluble, crystalline solid (m.p. 126°C.):



Formation of Monomethylol Urea.

Dimethylol urea, or mixtures of dimethylol urea and monomethylol urea, are valuable resin intermediates. The methylol ureas have also been widely used for the stabilization and crushproofing of rayon fabrics, and, to a lesser extent, for the modification of dextrins to improve water resistance.

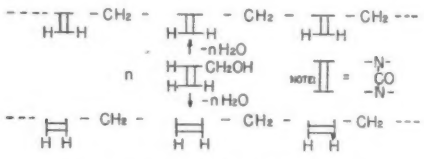


Formation of Dimethylol Urea.

The amorphous, insoluble, infusible products, "methylene-urea" *(2, 3)* and "Goldschmidt's compound" *(3, 4)*, are formed from urea and formaldehyde or from the appropriate methylol compounds, as shown, in the presence of strong acids. These products are complex *(5)* and probably polymolecular in nature. Inasmuch as they are of little practical interest to the resin chemist, except as side-reaction products to be avoided, the complex problem of their chemical constitution need not be discussed here.

The "B" stage condensation is conveniently carried out at temperatures above 60°C., and under carefully controlled, mildly acidic conditions. One or two important generalizations with respect to this condensation can be stated with some assurance. The reaction undoubtedly involves the linking together of a plurality of urea units to form essentially linear molecules, which are probably branched but not cross-linked to any complex network. The linkages involved derive from formaldehyde and are generally considered to be methylene bridges. (At ratios equal to or in excess of two moles of formaldehyde per mole of urea, there is some reason to believe that dimethylene-ether links ($-CH_2OCH_2-$) are also formed).

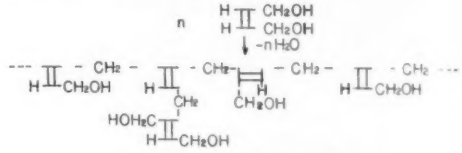
A brief consideration of the polycondensation of monomethylol urea, the simplest possible reaction of this type, may be helpful before proceeding to a consideration of the more complex reactions of dimethylol urea. Two possible mechanisms, probably oversimplifications of the actual process, are illustrated below and are presented rather as steps in a line of reasoning than as representative of actual fact:



Polycondensation of Monomethylol Urea.

Of the two alternatives the one involving reaction between the methylol group of one molecule and the primary amino group of the other, i.e., the one involving a "head-to-tail" structure, seems to be the more probable. In either instance linear molecules result which are probably not complicated by any appreciable branching, and which afford no opportunities for subsequent cross-linking and conversion to the "C" stage *(6)*.

The formation of most useful urea-formaldehyde resins involves dimethylol urea or a mixture of dimethylol and monomethylol ureas as important intermediates. Hence the "B" stage condensation of dimethylol urea is a matter of considerable importance. Unfortunately it is also a difficult question in terms of fine structural details, and one which is still controversial and unsettled. In a very general way the type of polycondensation mechanism which has had the support of Walter *(5, 7, 8)* and other leading investigators in this field may be represented:



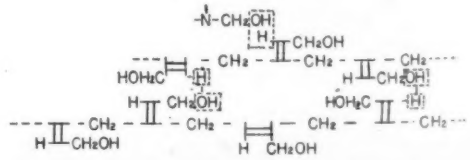
Polycondensation of Dimethylol Urea.

The probabilities for "head-to-head and "head-to-tail" configurations now seem to be about equal and a rather random distribution would be expected. Another manifestation of the random character of these resins would be a rather high degree of branching, a structural characteristic which is considered to be probable. At any rate, it seems quite certain that at this stage we are dealing with something less complex than a cross-linked, two- or three-dimensional network.

The "B" stage condensates are soluble or dispersible in water. The resulting solutions or dispersion exhibit certain colloidal properties. For example, wide variations in hydrophobe or hydrophil characteristics, directly relatable to composition variables, are exhibited. Viscosities are definitely higher than those of simple solutions and are rather sensitive functions of concentration, molecular size, and composition. Some of the hydrophils behave as protected colloids and deposit precipitates upon dilution with additional quantities of water. The question of average molecular size is a difficult one, and no completely satisfactory method for determination has yet been worked out. The best opinion, based on facts so far available, is that these "B" stage molecules probably contain not more than 10 or 20 urea units, *(5, 8, 9)*. Another important physical property of the "B" stage condensates is their relatively poor stability in solution. It is difficult to store these resins in a dilutable, reactive stage for periods of more than a few months. After such periods of time either gelation or excessive deposition of insoluble fractions is encountered.

It can be seen in the type of structure proposed for the "B" stage molecules that ample opportunities exist for cross-linking by the interaction of a methylol group on one chain with a nitrogen-bound hydrogen on another.

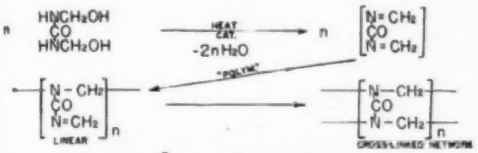
This process might occur in the following manner:



Conversion of "B" Stage UF-Polycondensate to "C" Stage by Cross Linking.

The formation of such a complex, cross-linked network would account for the ready formation of "C" stage, hard, brittle, insoluble, infusible products by the conversion of the "B" stage resins under the influence of elevated temperature or acidic catalysts or a combination of the two. The formation of such a network is in accord with modern theories of the behavior of thermosetting resins and the formation of insoluble, infusible end-products.

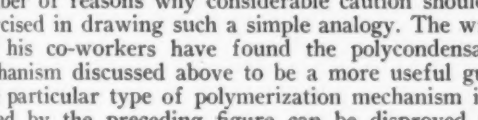
The exact nature of the urea-formaldehyde resin-forming reaction continues to be a matter of disagreement. Some chemists consider this reaction as a type of polymerization along a double bond, similar to that involved in the polymerization of a vinyl or ethylenic compound *(6, 10)*. The principle illustrated is representative of such views:



Proposed Mechanism for UF-Polycondensation.

Considered in this light, the analogy to the formation of linear polymers from styrene and to the formation of cross-linked polymers from divinyl benzene is quite striking and understandably tempting. There are a number of reasons why considerable caution should be exercised in drawing such a simple analogy. The writer and his co-workers have found the polycondensation mechanism discussed above to be a more useful guide. The particular type of polymerization mechanism illustrated by the preceding figure can be disproved very easily by gravimetric data.

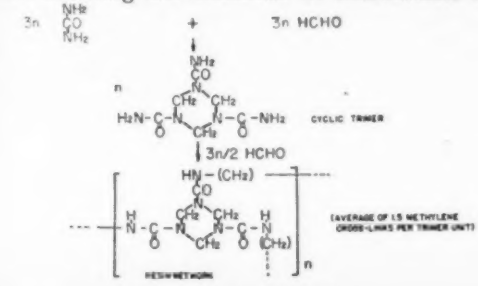
The Redfarn *(11)* mechanism, illustrated below, requires very little discussion:



Polycondensation of Dimethylol Urea by Redfarn Mechanism.

The formation of such four-membered rings with nitrogen-nitrogen bonds is, of course, improbable in terms of any known analogous chemistry. Furthermore, hydrolysis of the resins fails to form any hydrazine or substituted hydrazines, as would be expected from such a structure. And finally, this mechanism allows for no subsequent cross-linking in the "C" stage conversion.

A theory which has lately come to the foreground is that proposed by Professor Marvel *(12)* in extension of some of the ideas of Thurston *(13)*. According to this concept, a methylol urea, or a corresponding mixture of urea and formaldehyde, reacts to form a resin by a process involving the formation of intermediate molecules with six-membered rings:



Marvel-Thurston Mechanism.

In a recent paper Marvel has given a clear and persuasive presentation of this theory. In brief, Marvel has elected to consider urea as the first member of the homologous series of the amino-acid amides. He postulates that one end of the urea molecule behaves towards formaldehyde as a primary amine. This corresponds to the formation of a cyclic trimer with a six-membered ring structure, which is characteristic of many amine-aldehyde reactions. The other end of the urea molecule, then, is considered to exhibit the more sluggish behavior of an amide. The formation of bridges between these relatively less reactive amide groups is held to account for the formation of linear or cross-linked macromolecules containing a plurality of the six-membered ring units. Amides are known to be able to form methylol derivatives as well as compounds each with a methylene bridge between a pair of amide groups. According to the Marvel theory, some aspects of the geometry of the cured resin are different from those presented previously; however, the essential idea of a complex cross-linked structure persists.

Marvel and his co-workers have studied the reaction of formaldehyde upon representative amides of amino-acids and have shown that the behavior is actually essentially as outlined. Direct proof by the study of the urea-formaldehyde reaction itself, however, is not so easy, and the matter cannot yet be considered definitely settled. The different types of urea-formaldehyde products which can be prepared are difficult to account for in terms of any picture as simple as that just described. No one has yet isolated and clearly established the existence of the cyclic trimer postulated by Marvel. However, some sort of ring formation probably does play an important role in the complex urea-formaldehyde reaction. It is to be hoped that additional fundamental reaction studies, similar in nature to the excellent work of Marvel and his associates, will be forthcoming from the academic and industrial worlds.

The simple, unmodified, aqueous-type urea-formaldehyde resins have been used in large volume as molding powders, for laminating, as adhesives, and in the treatment of paper. Conversion to the final "C" stage is carried out under carefully controlled conditions of temperature and catalysis as part of the user's process. Most curing catalysts are either acid or materials capable of liberating acids at desirable rates under the application conditions involved. Concentration of hydrogen ions is an extremely important factor in determining the rate of cross-linking to the "C" stage; some special effects are sometimes attained also with certain polyvalent metallic cations. Ammonium salts constitute a widely-used type of delayed-action curing catalyst. In the presence of excess formaldehyde, always in equilibrium with "B" stage U.F. resins, and at concentrations usually employed in practice, acid is gradually liberated:

$$4\ NH_4X + 6\ HCHO \rightarrow (CH_2)_6N_4 + 4HX + 6H_2O$$

The pH drops as a function of time, temperature and concentration; and the shape of the pH-time curve can be varied almost at will by the proper choice of ammonium salts, together with appropriate acidic accelerators, basic retarders, or formaldehyde-acceptor retarders.

Ammonium salt catalysts are very commonly used in the curing of U.F. plywood adhesives. For this purpose the "B" stage resin is furnished either as a heavy, concentrated aqueous paste, usually at about 60 to 70% resin, or as a spray-dried resin powder to which water is added by the user in the preparation of the glue. Curing catalysts may be blended into the dry U.F. pow-

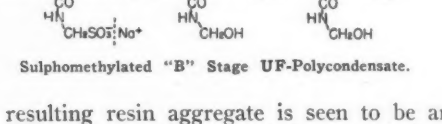
der by the resin supplier, but the liquid glue must be furnished catalyst-free for reasons of stability.

Typical urea-formaldehyde molding powders are made up of finely divided cellulose impregnated with "B" stage resin and mixed with a mold lubricant and a relatively mild, delayed-action catalyst. The presence of a filler, such as cellulose, is an important factor in overcoming the inherent brittleness and tendency toward crazing exhibited by unmodified U.F. resins. The excellent freedom from discoloration has contributed greatly to the success of such products.

Outstanding among the various services which the urea-formaldehyde resins have rendered to the paper industry has undoubtedly been the development of a simple and economical method for incorporating resin during the papermaking process to yield a sheet of vastly improved wet-strength. For the better part of a decade it has been possible to effect such an improvement by applying simple unmodified, aqueous-type "B" stage resins as tub size or spray to the formed sheet *(14)*. Such techniques have an important place in the industry and are still used in some mills. Almost from the outset, however, the advantages of adding the resin to the beater, with consequent simplification of the papermaking process, were clearly recognized. Unfortunately, all or nearly all the water-dispersible urea resins available prior to 1942-1943 were quite unsuited for addition to the pulp because of poor resin retention and/or because of resin precipitation at the high dilution ratios required.

The problem of beater addition was solved by chemical modification of the resin. By introducing electrolytic groups at intervals along the "B" stage molecules it was possible to attain high degrees of polycondensation, i.e.—prepare unusually large molecules, while maintaining infinite water dilutability in the final product. Such latitude stands in marked contrast to the limitations of the simple unmodified U.F. resin systems. One of the most important discoveries of recent years in the urea-formaldehyde resin field was the observation that a properly synthesized electrolytic, highly-condensed hydrophil could be adsorbed on pulp with sufficient efficiency to be economically attractive in a typical papermaking operation *(15, 16)*. For example it is possible to achieve wet-tensile strengths equal to about 35% of the dry strength by applying 3% of resin on dry pulp in the beater or at some point between beater and machine.

The sodium methylene-sulphonate group *(15)* is probably the most important elecrolytic solubilizing group which has been introduced on an industrial scale in the production of such highly condensed hydrophils for the paper industry. Sulphomethylation is achieved cheaply and easily by the use of sodium bisulfite in conjunction with the formaldehyde normally used in the resinification. Polycondensation and sulphomethylation are conveniently carried out as simultaneous, competing reactions to form a "B" stage molecule somewhat as represented below:



Sulphomethylated "B" Stage UF-Polycondensate.

The resulting resin aggregate is seen to be anionic in nature, that is, capable of existing in solution as a negative ion, a fact which doubtless affects the adsorptive properties. Also, as implied previously, the size of the resin molecule or ion in solution has been found to exert a tremendously important influence upon efficiency of retention on the cellulose. Inasmuch as the resin is of anionic character, it might be predicted that an important consideration would be the nature of the cations present in the solution. Such has indeed been found to be true. Certain of the heavy metal cations, such as lead or barium, will precipitate the resin; indeed, some of the present knowledge of the resin molecule derives from chemical analyses of such precipitates. For example, the following data were obtained upon analyses of the barium salt of a representative sulphomethylated urea-formaldehyde hydrophil (composition not necessarily the same as that of any resin offered commercially at present):

CHEMICAL COMPOSITION OF THE BARIUM SALT [a] OF A SULPHOMETHYLATED U.F. HYDROPHIL RESIN *(17)*

Analyses:	Air-Dried [b]	Baked [c]
Nitrogen	23.15%	26.45%
Sulphur	2.28	2.39
Barium	5.45	5.84
Chlorine	0.13	0.19
Calculated Atomic Ratios:		
S/N	0.0431	0.0396
S/Urea	0.0862	0.0792
Ba/N	0.0240	0.0225
Ba/Urea	0.0480	0.0450
Ba/S	0.557	0.568
Ba equivalents/S	1.11	1.14

[a] Precipitated by addition of excess aq. $BaCl_2$ to a water solution of the resin in the form of its sodium salt. Precipitate repeatedly washed in effort to remove occluded $BaCl_2$.
[b] Sample air-dried overnight.
[c] Sample air-dried overnight and cured by baking for 90 min. at 125° C.

The data show an average incidence of about one sulphonate salt group for every twelve or thirteen urea units for the particular sample studied. Only slightly more than the predicted 1.0 equivalent of barium appears for each sulphonate group.

Experience has shown that the sulphomethylated hydrophil is retained with enhanced efficiency when used in conjuction with sizable quantities of an aluminum salt. The use *(16)* of such a resin requires no change in those papermaking processes in the course of which substantial quantities of aluminum sulphate, papermakers alum, are normally added to the pulp. Here the alum reduces the pH to a desirable level in the range of 4.0 to 4.5 and furnishes the requisite aluminum ions. At such a pH the cure of the resin is adequately initiated under the temperature conditions normally prevailing in most drier sections. However full wet strength is usually not realized until the treated paper has aged for 1 or 2 weeks. Broke recovery of the unaged paper can easily be achieved without special precautions, whereas the fully aged product may require beating or hydrapulping at pH's of 4 to 5 and temperatures of 140-160° F.

The exact mechanism by which such resin treatment increases wet strength is not known. It has been easy to show that improvement of the inter-fiber bonds plays a far more important role than any strengthening of the individual fibers.

In addition to the anionic types, it has been possible to prepare U.F. hydrophils solubilized by cationic groups or by polar non-ionic groups. When dealing with the positively charged types, special heed must be given to the nature of the anions present in the solution. Furthermore, it has been possible to introduce functional groups which render the "B" stage molecules more reactive in the sense that curing can be achieved at higher pH's and under generally milder catalytic conditions *(18)*. Such activity represents an important advantage in the production of toweling and other absorbent types, inasmuch at the concentration of acidic materials, especially alum, must be reduced to low levels and the sheet formed at relatively high pH's.

Another and very different use of urea resins in the paper field has been the fortification of degraded starch

or dextrin adhesives used in the laminating of fiberboard *(19)*. As little as 5 to 10% of a simple unmodified "B" stage U.F. resin, based on the starch, can be made to effect a tremendous improvement in the water resistance and durability of the bond between the paper layers. The resin is preferably added to the starch-water mixture before cooking (for example, at 180 to 190° F.) to hydrate and gelatinize the starch. Then the mixture is cooled to 130° F. or below and the catalyst added, usually an aluminum or ammonium salt of a strong acid.

It is generally accepted and well-nigh certain that such waterproofing of starch is the result of an actual chemical interaction between the "B" stage polycondensate and the starch, probaly between the methylol groups of the resin molecules and the hydroxyl groups of the polysaccharide. Such interactions are known to occur between U.F. condensates and simple polyhydric alcohols *(20)*.

Another outlet for urea resins in the paper industry, and one which may become very important, is the fortification of the starch binder in clay coatings *(21)*. Previous to the war the preferred binder was casein. When this protein became critically scarce and expensive it was replaced in large part by the cheaper dextrin types of binders. These have been quite satisfactory in terms of most application properties, but the water resistance of the resultant coatings was inferior to the quality required for certain papers.

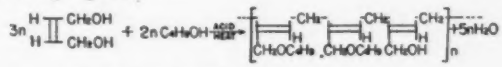
The very striking success achieved in the laminated fiberboard field naturally suggested that a urea-formaldehyde ingredient should be the answer to the problem of the poor water resistance of starch-clay coatings. Unfortunately the pH's consistent with optimum dispersion of the clay pigment lie above 7.0 and hence considerably above the level of 3 to 4 at which urea-formaldehyde condensates effectively react with carbohydrates. Some lowering of pH has been achieved by the use of certain polyphosphate dispersing agents, but a completely satisfactory solution to the problem will probably require further investigation. Of the urea resins currently available, the sulphomethylated anionic hydrophil, alluded to above, has proved to be one of the best and is recommended for use at about 10 to 20% on starch solids.

One of the most important advances in the urea resin field during the past decade has been the development of modifications soluble in a wide variety of organic solvents, an achievement which has exerted a tremendous influence on some important branches of the surface coatings industry *(22,23)*. The water-dispersible "B" stage resins mentioned in the preceding paragraphs are insoluble in or undilutable with virtually all common organic solvents; furthermore they are generally incompatible with most known plasticizers and other resins. These factors, together with serious shortcomings in the way of brittleness and poor adhesion to metal, rendered the water-dispersible urea resins unsuited to most types of coating applications, even though other properties, such as hardness, speed of cure, chemical resistance, and freedom from discoloration were most attractive.

Again chemical modification of polycondensate molecule provided the solution to the problems of insolubility and incompatibility. The underlying principle can perhaps be best understood by first considering the ethers *(24)* of dimethylol urea. These are crystalline compounds soluble in alcohol, and in some instances, in other common organic solvents as well. A general method of preparation may be illustrated:

Formation of Diakyl Ether of Dimethylol Urea.

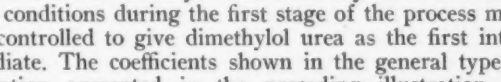
This same type of reaction can be combined with polycondensation to yield a modified linear or branched linear molecule with a number of solubilizing alkoxy groups *(23, 25)*. The general idea is presented in the following figure:



UF-Polycondensation with Butanol Co-reaction.

Here the reaction is considered as a polycondensation of dimethylol urea, much after the manner of the "B" stage condensation previously shown, together with a supplementary etherification reaction resulting in the introduction of the alkoxy groups. Thus there is a problem in competing reactions, and the preparation of a suitable product is very largely a matter of controlling the relative rates of the two types of reactions. Of course it is not necessary to commence with solid dimethylol urea as starting material; a corresponding mixture of formaldehyde and urea may be used instead, but conditions during the first stage of the process must be controlled to give dimethylol urea as the first intermediate. The coefficients shown in the general type of equation presented in the preceding illustration are selected somewhat arbitrarily and may be varied over considerable ranges. The average number of alkoxy groups per urea unit may be varied, and the total yield of water removed is also a variable subject to control.

It has been possible to isolate the "B" stage alkoxy modified urea-formaldehyde resins by precipitation with a nonsolvent. In the solvent-free condition these prove to be solid resins. The results of elementary analyses of just such a precipitated sample are shown:



Chemical Composition of Precipitated UF-Butanol Resin *(25)*.

	Calc. for $(C_{17}H_{34}O_4N_2)x$	Found (Micro-Combustion)
% C	48.80	48.72
% H	8.13	7.90
% N	20.10	20.20 (Dumas)
% N	22.97	23.18 (By Diff.)

The analyses agree very well with a postulated structure containing two butoxy groups for every three urea units. It is to be emphasized again that this ratio of alkoxy groups to urea units can be varied over a considerable range and that the rather striking two-to-three ratio exemplified here is fortuitous.

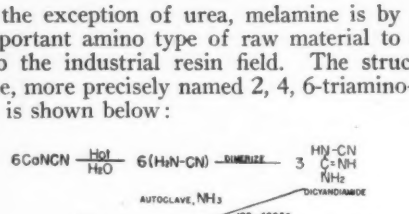
The change in properties accompanying the introduction of the alkoxy groups is strikingly great. Whereas the unmodified aqueous "B" stage urea-formaldeyhde types show very little solubility in or tolerance for most organic solvents, the alkoxy-modified "B" stage products are soluble in nearly all common organic solvents, including aromatic hydrocarbons, and may be dissolved in mixtures of alcohol and petroleum solvent. Furthermore, the modified resins are compatible with a wide variety of other organic-solvent-soluble resins. Alkyd-urea combinations based on resins of this type may be satisfactorily baked in 20 minutes or less at 300°F., a speed sufficient to render them attractive in a large number of applications.

Of the varied uses of the urea coating resins, the most important continues to be the hardening of alkyds in pigmented enamels, such as those used on refrigerators, washing machines, stoves, kitchen cabinets, and hospital equipment.

In the industrial resins produced in any appreciable volume so far, the normal butyl and isobutyl groups have predominated. Resins of this type are particularly attractive in terms of ease of manufacture and resulting properties. It may be mentioned that homologous resins with both larger and smaller alkyl groups have been investigated and found to present some interesting variations in solubility, compatibility and curing properties *(25)*.

Melamine-Formaldehyde Resins

With the exception of urea, melamine is by far the most important amino type of raw material to find its way into the industrial resin field. The structure of melamine, more precisely named 2, 4, 6-triamino-1, 3, 5-triazine, is shown below:



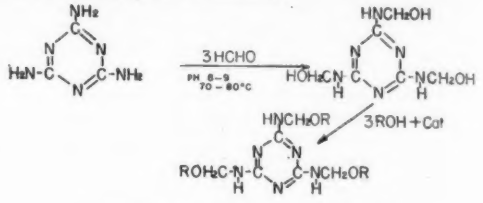
Preparation of Melamine *(26)*.

The triamino-triazine structure is the one more commonly accepted for this compound, although there is good reason to believe that it also exists in equilibrium with the imino tautomer shown side by side with the other structure.

The sequence of reactions diagrammed for the synthesis *(26)* of melamine shows the use of a relatively cheap starting material, calcium cyanamide. Dicyandiamide, or perhaps more properly cyano-guanidine, is an easily prepared and important intermediate in the melamine synthesis. Dicyandiamide is also of potential value as an intermediate in the preparation of ether related heterocyclic compounds. A number of patents describe the final step for conversion of dicyandiamide to melamine; the conditions shown are simply illustrative and do not necessarily pertain to those in actual use today.

Melamine is much more resistant to hydrolysis than urea and also exhibits superior heat stability. In fact, it is stable almost up to its melting point, which is usually given at 354°C. Melamine exhibits a maximum functionality towards formaldehyde of six, which is unusually high in a compound of such a relatively low molecular weight. All these basic aspects of melamine seem to be reflected in the resulting resins preparerd by reaction with formaldehyde. For example, these resins show outstanding chemical resistance and heat stability, The higher functionality towards formaldehyde is undoubtedly responsible for the more rapid cure, greater hardness, and more pronounced brittleness of the resulting resins.

With the exception of the significantly greater functionality toward formaldehyde, the general chemistry of the melamine-formaldehyde reactions seems to parallel rather closely that already presented for urea. As for the "A" stage condensation, the formation of analogous methylol compounds is easily achieved *(27)*. Here the maximum functionality of six may be exhibited. The following illustration shows, first of all, the formation of trimethylol melamine:

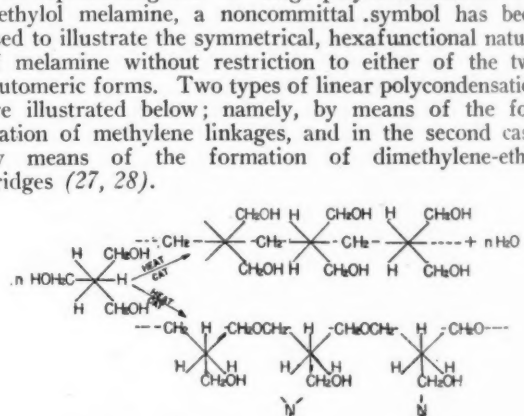


Preparation of Trimethylol Melamine *(27)* **and Trialky Ether** *(28)*.

Here again it is very important to observe generally mild reaction conditions with careful control of pH. In general, the melamine-formaldehyde reactions are even more sensitive to traces of acid and small variations in pH than are the analogous processes involving urea. Although the introduction of only three methylol groups is shown by the figure above, it is easily possible to introduce as many as six *(27, 28)*.

There are, of course, greater opportunities for complexities in the structure of the polycondensate molecule obtained by reaction with formaldehyde. As already noted, careful control of catalytic conditions is of paramount importance. The general principle of formation of linear and branched linear "B" stage molecules by linkages derived from formaldehyde seems to obtain in this instance also. The methylene bridge is again possible here, and it is of interest to note that recent work has shown that dimethylene-ether linkages play a particularly important role in the formation of the melamine-formaldehyde polycondensate molecules *(27, 28)*.

In representing the "B" stage polycondensation of a methylol melamine, a noncommittal .symbol has been used to illustrate the symmetrical, hexafunctional nature of melamine without restriction to either of the two tautomeric forms. Two types of linear polycondensation are illustrated below; namely, by means of the formation of methylene linkages, and in the second case, by means of the formation of dimethylene-ether bridges *(27, 28)*.



"B" Stage Polycondensation of a Methylol Melamine.

Even though they are considerably more expensive than their urea counterparts, the melamine-formaldehyde resins have won for themselves positions of tremendous importance in the molding powder and laminating fields because of outstanding advantages in resistance to water, alkali, solvents, and reagents in general. Colors are excellent, even upon unintentional "overcure," and the favorable electrical properties are considered important in some applications.

There has been some acceptance of melamine adhesives in the plywood field but so far no really dominant position has been attained, partly because of the strong

competition of the urea, phenolic, and resorcinol types. Color is usually not a problem, and the plywood industry is quite cost-conscious.

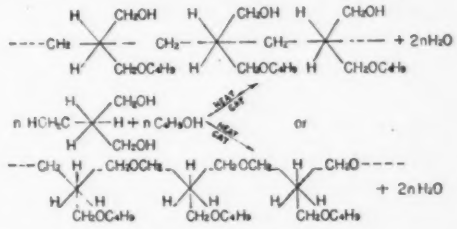
By far the most important use of melamine-formaldehyde resins in the paper field has been in the production of wet-strength grades *(29)*. Wohnsiedler *(30)* and co-workers discovered a unique principle according to which it is possible to prepare positively charged, i.e., cationic, colloidal dispersions which are water dilutable and which can be adsorbed by pulp with sufficient efficiency to yield a finished sheet of high wet strength. In practice, a low-condensed, "B" stage, M.F. polycondensate is furnished as a dried powder to the paper manufacturer. Prior to its use, the resin is dissolved in aqueous hydrochloric acid and allowed to age for a number of hours, 3 to 12 for example, before addition to the pulp. Good results have been attained with resin concentrations of 10 to 15% during the aging period and proportions of HCl amounting to 0.6 to 1.0 mol per melamine equivalent in the resin *(31)*.

Although simple aqueous M.F. reaction solutions are ordinarily very sensitive to traces of acid, which rapidly catalyze formation of hydrophobles and gels, the Wohnsiedler process apparently takes advantage of the slight basicity and salt-forming capacity of the melamine unit. Melamine itself is a weak base, roughly comparable to pyridine, whereas urea is almost neutral. If a strong acid is added in roughly stoichiometric amounts to a soluble melamine-formaldehyde condensate, something akin to salt-formation occurs and the polycondensate molecule becomes cationic in nature. As long as the temperature is low enough and as long as the concentration of the solution or dispersion is low enough to combat cross-linking tendencies, the polycondensate molecules, by virtue of their electrolytic nature, remain hydrophilic and can be condensed to larger molecules, under the catalytic influence of the acid present, without gelation or precipitation. The aging period, then, results in the formation of cationic, highly condensed, water-dispersible resin molecules which are well suited for adsorption on pulp in a typical paper machine furnish.

Operating pH's of 4 to 5 are preferred, but useful results can be attained in the range of 5 to 6. In general, the wet strength tends to fall off with elevation in pH. The conditions obtaining in a typical drier section are adequate for initiating the cure *(31)*.

The melamine paper resin usually affords higher wet strength per pound of product used than do any of the special ionic urea types previously discussed. For some uses the ratio of efficiencies is such that the job can be done as well and at lower cost with the urea resin. In other instances the levels of performance required are such that only the melamine process is adequate. The melamine-formaldehyde treatment results in a more permanent wet-strength property, which is sometimes advantageous but which also is reflected in greater difficulty in the recovery of "broke" and waste paper. Experience has shown that both the urea and melamine types have their own spheres of natural and logical preference in the paper industry and that both will, in all probability, continue to be used in large volume for some time to come.

One more large-volume use of melamine resins remains to be mentioned, namely the use of the alcohol-modified, solvent-soluble resins in the coatings industry. Requisite solubilities and compatibles can be attained by the introduction of modifying alkoxy groups, in a manner quite analogous to that previously discussed for the urea coatings. This principle and the polycondensation reaction are shown diagrammatically in the following equation *(25), (27)*.



MF Polycondensation with Butanol Co-recation.

It has been found possible to introduce alkoxy groups to the extent of about one per melamine nucleus. This ratio may be varied; the one shown here has been selected for simplicity and is not necessarily representative of any standard product now being ocered on the market. The solubilizing improvements and effects on compatability are every bit as striking here as in the corresponding modification of the urea-formaldehyde resins. A very attractive combination of storage stability and speed of cure can readily be attained.

The melamine coating resins are superior to the urea analogs with respect to speed of cure, hardening efficiency, resistance to high bake and overcure, and alkali resistance *(27)*. At normal baking temperatures of 250 to 300° F., the melamine resins require approximately one-third less conversion time than the ureas. The speed advantage is particularly important in the range of 180 to 225° F., whereas the resistance to discoloration and general degradation at higher temperatures is most advantageous above 300° F. Combinations of alcohol-modified melamine resins with nondrying alkyds are particularly suitable for high-bake applications and for stove enamels.

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(101) Plastic Conference

The first in the series of TAPPI fall meetings will be sponsored by the Plastics Committee, E. C. Jahn, New York State College of Forestry, Chairman. This will be a two-day meeting, August 16th and 17th, to be held at the Institute of Paper Chemistry, Appleton, Wis. Individuals planning to attend should make room reservations directly with the Conway Hotel, Appleton, Wis., where a b'ock of rooms have been allocated to the Technical Association.

Following is the program:

Monday, August 16

Symposium: Resins to Fiber Bond
Prof. Herman Mark, Polytechnic Institute of Brooklyn, Chairman

9:30 a.m. Opening of meeting by Dr. E. C. Jahn, Chairman TAPPI Plastics Committee
2. Adhesion of Rubbers to Cellulose, by J. Compton, B. F. Goodrich Company

1:30 p.m. 3. Amino-plastics, by R. C. Hasselbart, Plaskon Division, Libby-Owens-Ford Company
4. Vinyl and Vinyldiene Polymers, by R. L. Steller, Plastics Division, B. F. Goodrich Company

Tuesday, August 17

Panel Discussion: Plastics in Paper Converting
R. H. Mosher, The Marvellum Company, Chairman

9:30 a.m. 1. Equivalent for Application of Plastics to Paper
2. Solvent Coatings, by Creed Grumbles, Shellmar Products Corporation
3. Hot Melt Coatings, by Paul Yoder, Pyroxylin Products Company

1:30 p.m. 1. Water Dispersion Coatings, by R. M. Upright, Dow Chemical Company
2. Organosol and Plastisol Coatings, by John Rich, Plastic Film Corporation
3. New Developments in Resins for Coatings, by J. C. Pullman, American Cyanamid Corporation

Note: Individuals planning to attend should notify T. A. Howells at the Institute of Paper Chemistry, Appleton, Wis., if they will attend a dinner planned for the evening of August 16th and if they wish to have bus transportation provided for them to Madison, Wis., on August 17.

(102) Fundamental Research Conference

The second in the series of TAPPI fall meetings will be sponsored by the Fundamental Research Committee, Harry F. Lewis, Institute of Paper Chemistry, Chairman. The feature subject will be "The Physical Properties of the Components of Wood." The meeting will be held at the Forest Products Laboratory and the University of Wisconsin, Madison, Wis., on August 17-20, 1948.

Arrangements have been made with the University of Wisconsin to house and feed up to 150 guests in Kronshage Hall, a modern dormitory, situated on Lake Mendota. The University has given a flat price for room and board of $15.50, payable in advance. This includes four nights lodging, August 17-20, and breakfast, lunch, and an evening banquet on August 18, breakfast, lunch and dinner on August 19, and breakfast and lunch on August 20th. *All prepaid reservations must be received by Dr. Alfred J. Stamm of the Forest Products Laboratory, Madison, Wis., not later than August 2nd.* The dormitory rooms are all double rooms and will be occupied by two persons. Accommodations can be arranged for husband and wife, single women, and children. Please designate when requesting accommodations for other than adult males.

There is a swimming beach in front of the dormitory. Bring along swimming togs. A boat ride on Lake Mendota has been arranged for the evening of August 19.

Those who wish to tour the Forest Products Laboratory and visit the ultracentrifuge laboratory of the Chemistry Department or other University laboratories will have an opportunity to do so on August 17. Dr. George J. Ritter of the Forest Products Laboratory will make arrangements for you. Please designate your intentions in this respect in advance so that arrangements for handling groups can be made.

Following is the program:

Wednesday, August 18

Registration at the Forest Products Laboratory, beginning at 8:30 a.m.

9:00 a.m. Opening of meeting by Dean Harry F. Lewis of the Institute of Paper Chemistry and Chairman of the TAPPI Fundamental Research Committee

9:30 a.m. Topic No. 1 Microstructure of Wood and Wood Components
Reviewer: Dr. George J. Ritter, Forest Products Laboratory
Discussion Leader: Dr. Thomas Kerr, North Carolina Agricultural Experiment Station

1:30 p.m. Topic No. 2. Submicroscopic Structures of Wood and Cellulose
Reviewer: Prof. Herman Mark, Dept. of Chemistry, Polytechnic Institute of Brooklyn
Discussion Leader: Dr. W. A. Sisson, American Viscose Company

Thursday, August 19

8:30 a.m. Topic No. 3. Wood and Fiber-Liquid Relationships
Reviewer: Dr. W. Boyd Campbell, Pulp and Paper Research Institute of Canada
Discussion Leaders: (Fundamental Phases) Dr. James d'A. Clark, Pulp and Paper Consultant
(Applied Phases) Dr. L. V. Forman, Institute of Paper Chemistry

1:30 p.m. Topic No. 4. Passage of Materials Through Wood, Paper, and Fabrics
Reviewer: Dr. Alfred J. Stamm, Forest Products Laboratory
Discussion Leader: Dr. Milton Harris, Milton Harris & Associates

Friday, August 20

8:30 a.m. Topic No. 5. Physical Properties of Lignin
Reviewers: Dr. F. E. Brauns, Institute of Paper Chemistry, and Dr. Holger Erdtman, Royal Institute of Technology, Stockholm, Sweden
Discussion Leader: Dean Harry F. Lewis

1:30 p.m. Topic No. 6. Shrinking and Swelling of Wood, Paper Products, and Textile Fibers, and Their Control
Reviewer: Dr. Harold Tarkow, Forest Products Laboratory
Discussion Leader: Dr. J. A. Van den Akker, Institute of Paper Chemistry

Note: Directions for getting to the Forest Products Laboratory and Kronshage Hall by car:

To Lab: Take University Avenue (U. S. Highways 12 and 14) west from Madison (or east if approaching Madison from northwest) to Walnut Street (1 block east of Highland where first Madison stop light, when approaching from west is located) turn north to Lab.

To Kronshage Hall: Following University Avenue (U. S. Highways 12 and 14) either westward or eastward to railroad crossing, turn north on drive just east of the tracks. Follow Willow Drive to Lake where group of dormitories is located

New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

John E. Bray, Jr., Assistant Chemist, Lowe Paper Co., Ridgefield, New Jersey, a 1944 graduate of Cornell University.

William Brogan, Chief Control Chemist, Atlanta Paper Co., Atlanta, Georgia, a 1947 graduate of Emory University.

Mohammed Eklas, Graduate Student deputed by Government of Pakistan, University of Maine, Orona, Maine, a 1938 graduate of Muglim University, Aligarh, India with an M.Sc. degree.

Robert J. Harlow, Student, University of Maine, Orono, Maine.

George P. Maniates, Chief Chemist, National Container Corp. of Virginia, Big Island, Virginia. Attended Virginia Polytechnic Institute.

William S. Milne, Statistician, Hawley Pulp & Paper Co., Oregon City, Oregon, a 1943 graduate of Oregon State College.

William Wallace Scott, Research Chemist, Mallinckrodt Chemical Works, St. Louis, Missouri, a 1941 graduate of Princeton University.

Gabriel T. Turula, Student, New York State College of Forestry, and a 1948 graduate of that college.

James A. Walsh, Plant Superintendent, Link Paper Co., Jersey City, New Jersey.

Charles A. Werner, Production Manager, Bensing Bros. & Deeney, Inc., Wakefield, Massachusetts, a 1921 graduate of St. Mary's College.